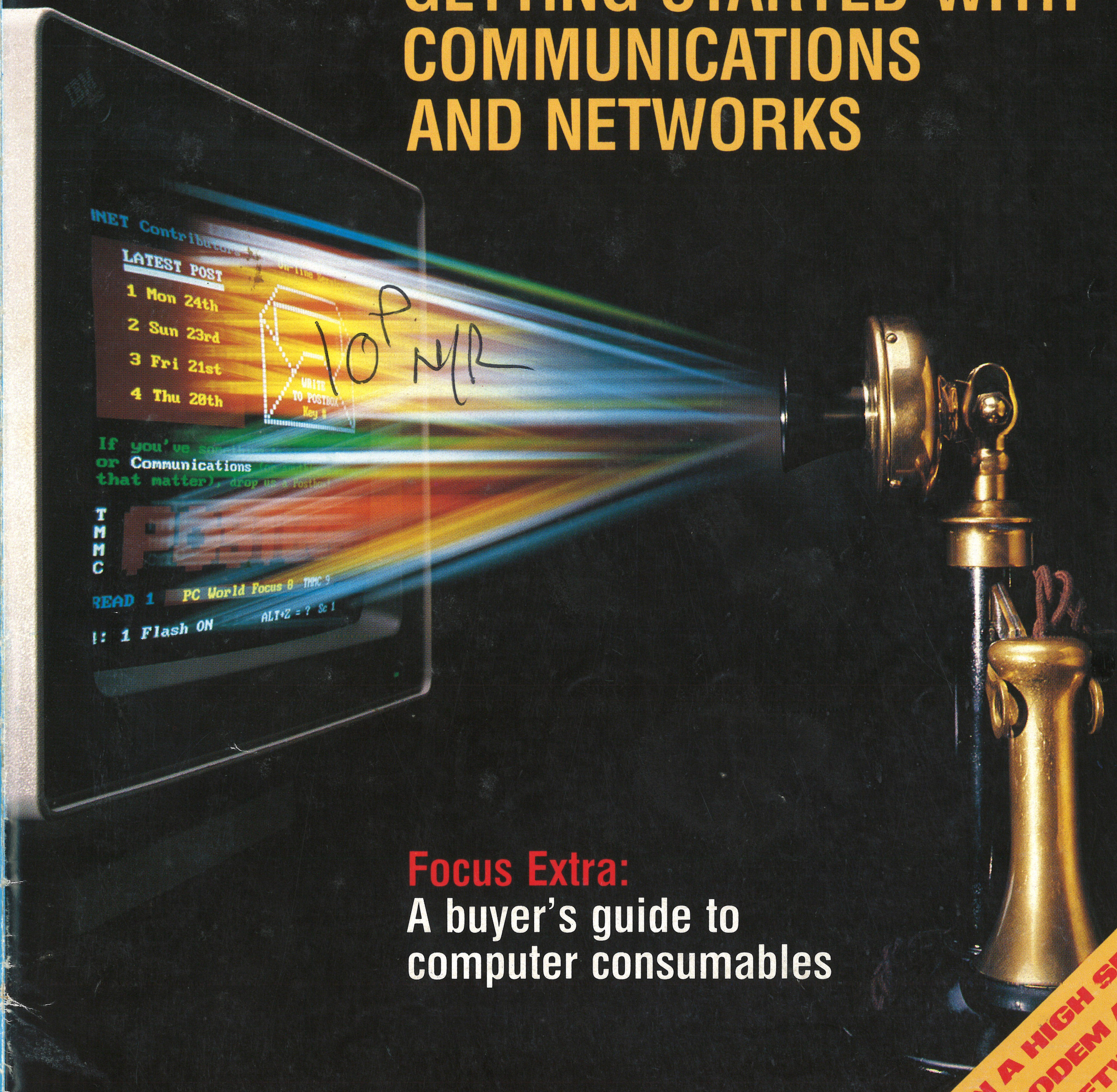
# PC World FOCUS

September 1989 Number 7

BUSINESS SOLUTIONS FOR PC USERS

## GETTING STARTED WITH COMMUNICATIONS AND NETWORKS



10p MR

**Focus Extra:**
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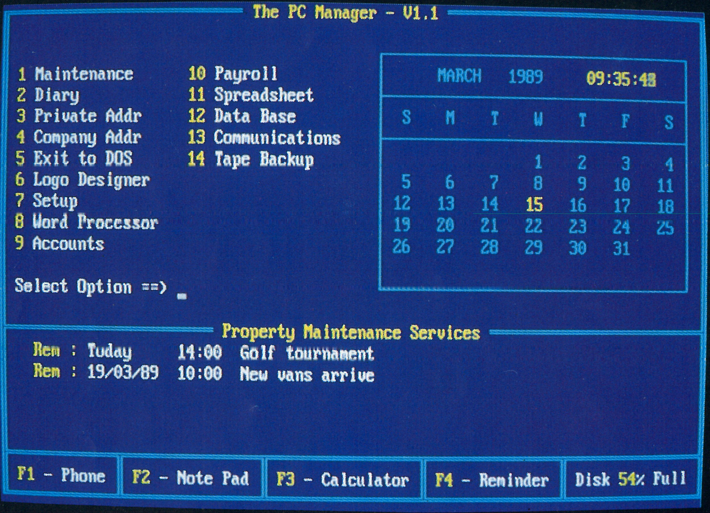
# A SELECTION FROM OUR MENU...



```
Rem : Today     14:00  Golf tournament
Rem : 19/03/89  10:00  New vans arrive
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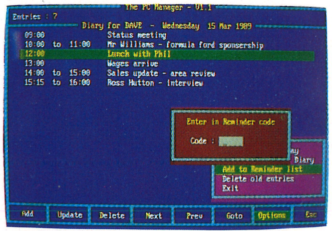
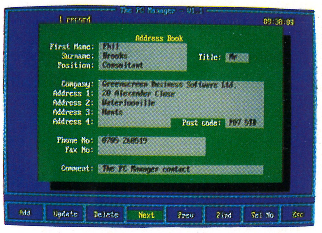


```
Entries : 7
Diary for DAVE  -  Wednesday  15 Mar 1989
09:00              Status meeting
10:00  to  11:00   Mr Williams - formula ford sponsership
12:00              Lunch with Phil
13:00              Wages arrive
14:00  to  15:00   Sales update - area review
15:15  to  16:00   Ross Hutton - interview
```

*Full feature diary*



```
1 record                                  09:38:03
First Name: Phil
   Surname: Brooks                  Title: Mr
  Position: Consultant

   Company: Greenscreen Business Software Ltd.
 Address 1: 20 Alexander Close
 Address 2: Waterlooville
 Address 3: Hants
 Address 4:                    Post code: PO7 5TB

  Phone No: 0705 268519
    Fax No:

   Comment: The PC Manager contact
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# PC World FOCUS

BUSINESS SOLUTIONS FOR PC USERS

September 1989 Number 7

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There's more to buying printer paper, ribbons, disks and other consumables than meets the eye. Manek Dubash reports on how you can save money and avoid problems when the time comes to feed the hardware.

FRONT COVER PHOTOGRAPHY BY CHRIS BELL

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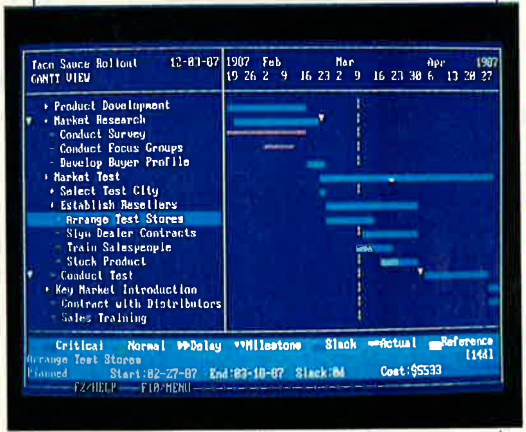

```
Taco Sauce Rollout        12-01-07 1907  Feb          Mar            Apr      1907
GANTT VIEW                         19 26 2  9  16 23 2  9  16 23 30 6  13 20 27
  ▸ Product Development
  ▸ Market Research
    - Conduct Survey
    - Conduct Focus Groups
    - Develop Buyer Profile
  ▸ Market Test
    ▸ Select Test City
    ▸ Establish Resellers
      Arrange Test Stores
    - Sign Dealer Contracts
      Train Salespeople
      Stock Product
    - Conduct Test
  ▸ Key Market Introduction
    Contract with Distributors
    Sales Training
    Critical    Normal  ▸▸Delay  ▾▾Milestone   Slack  ═Actual  ▬Reference
Arrange Test Stores                                                   [144]
Planned       Start:02-27-07  End:03-10-07  Slack:04        Cost:$5533
      F2/HELP    F10/MENU
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# Modem Living

What online services are there for people with the urge to communicate?

BY
**Steve Gold**

Somewhere out there is a computer waiting to hear from you — or, to be more precise, from your computer. We are constantly being told that this is the age of communications in which computers play a crucial role. And there are plenty of online services enticing you to hook up and enjoy their beneficience.

Yet the whole area of computer communications was, until recently, a potential black spot for the average person. This was due to the relative complexity of modems and their associated communications software, not to mention the baffling variety of services and command structures of the online systems themselves.

Fortunately, things seem to be getting better. Getting a modem, a computer and some communications software to work in harmony might still involve some hair-tearing and foul language, but once you've got that far, things have never been better in terms of actually getting some useful work out of the kit.

Before you go online, however, it pays to be aware of how much your phone call is costing you. Generally speaking, the morning period (9am to 1pm, Monday to Friday) should be avoided if at all possible and even the standard rate period (8am to 9am and 1pm to 6pm Monday to Friday) should only be used if absolutely necessary. Outside of these times, cheap rate is in effect, with a local telephone call working out to be a shade over 50 pence an hour, and even a trunk call to London costs just 5 pence a minute from all but the most remote of places.

One way of saving money on long distance telephone calls with your modem is to sign up to Mercury's alternative telephone service, Mercury 2300. This costs just £7.50 plus VAT a year, and can save you as much as 35 per cent on your trunk and international calls. Not only are Mercury's call charges cheaper on a per-minute basis, but Mercury 2300 bills its trunk and international calls in increments of tenths of a penny, subject to a minimum of 3 pence per successful call. Compared to BT's 4.6 pence per 'unit' charging system, Mercury's call charges are much more allied to how long you spend online with your modem. One useful bonus of using Mercury's network (accessible by dialling 131 on BT's network) is that your voice calls are cheaper.

The bad news with Mercury is that the 2300 service is only available in certain areas in the UK. The list of exchanges served by Mercury 2300 is growing, however, so it's worth checking with Mercury on the freephone number given at the end of this feature. Most users paying more than £75 a quarter on their BT bills will probably find that using Mercury can save them money. Be warned, however, that the codes for dialling Mercury are fairly lengthy, and may require you to buy a 'smart' phone (typical cost £30 upwards) unless your existing phone, modem or communications software can handle tone dialling.

Once you're ready to go online you have to decide who — or what — you're going to call. Services range from free, club-like bulletin board systems (BBS) through to highly expensive online databases offering masses of, sometimes arcane, information.

## BULLETIN BOARDS

Like your old school noticeboard, a computer BBS functions as an interchange of information and ideas. The facilities available on a BBS range from simple messaging — known as electronic mail in the trade — right through to the uploading and downloading of programs and other files.

Uploading and downloading of computer software has become one of the most popular pastimes of BBS users the world over. Because of the laws of copyright, it is illegal to upload copyrighted (commercial) software to online systems. Most software available on BBSs tends, therefore, to be either public domain, or shareware, where the author requests a license fee from anyone who uses his/her software.

Running a BBS takes a lot of time and a fair amount of money. Most BBSs in the UK are run by modem enthusiasts who have delved into the world of computer communications and — for various reasons — decided to set up their own online systems.

To repay their efforts, many BBS system operators (sysops) request a modest annual subscription — typically £10 — for allowing access to their systems. The subscription fees are usually ploughed back into the BBS and used for improving facilities for subscribers and obtaining the latest shareware and public domain packages from other sources, such as online systems in the US.

Bulletin boards in the UK fall into two very general categories — scrolling ASCII and viewdata format.

Scrolling ASCII format means that data is fed from a modem onto the computer screen in a sequential manner. As data feeds in from the bottom of the screen, so earlier data scrolls off the top of the screen. The term ASCII is the official name for seven bit data. Scrolling ASCII BBSs tend to have a screen width of 80 characters. Coupled with a 25 line depth on the average computer monitor, scrolling ASCII systems can present a lot of information on a single computer screen.

Viewdata BBSs, on the other hand, use a 40 column screen, with large colourful characters like those seen on Ceefax and Oracle, the TV teletext services. As with teletext, viewdata is presented in TV screen-sized chunks of data, usually measuring 40 columns by 20 lines. As each screen is completed, so the screen is cleared and the next screen of data appears.

These subtle differences combine to make scrolling ASCII systems largely incompatible with viewdata systems. Just as the BBS software needs to be different to feed the data down the phone line, so the communications software required by these two online formats differs as well. The vast majority of communications software currently available in the UK supports both scrolling ASCII and viewdata formats.

Perhaps the ultimate bulletin board is CIX. This is the Compulink Information eXchange — a teleconferencing system where the online messages are grouped by subjects. The software allows you to follow the thread of a discussion, making comments as you go, and you can set up conferences of your own. There's plenty of software to download, and the system supports high speed MNP modems. There are time charges, with a £5 monthly minimum, but joining up is easy — just log on to the system (Tel: 01-399 5252, eight data bits, no parity) and quote your credit card number.

## PRESTEL AND ALL THAT

Prestel is the name of British Telecom's public viewdata network. First launched in 1979, the service has undergone a number of transformations to become one of the most popular online systems in the UK today, with close on 100,000 subscribers.

Subscribing to Prestel costs £8 a quarter, plus 7p per minute during office hours, and 1p a minute during off-peak times. These charges are in addition to the cost of a local phone call (from anywhere in the UK) to Prestel. Some frames of Prestel information are chargeable (up to 99p).

Prestel's mailbox system, recently revamped, is highly sophisticated and allows very long messages, as well as mailing lists to be maintained. If your message runs for more than one screen (typically 600 characters) each frame then costs 1p to send. Single frame mailboxes are free.

Prestel also allows telexes to be sent and received via the UK and international telex network. Shortly, it will be possible to send electronic mail to other online systems via a special pay-as-you-go facility.

Although Prestel is run by BT, many of the areas of information on the system are maintained by information providers (IPs). One major IP is Micronet, a subsidiary company of BT, which runs a computer-oriented area on Prestel with around 25,000 pages of information. In essence, Micronet is an online computer magazine, although the medium allows 24-hour access and 'instant' updates.

Micronet also offers several facilities such as downloadable software (telesoftware) and a chatline service. Chatlines are the online equivalent of citizens band radio, with messages sent by users for display to everyone else. Since it's possible to 'look back' over the most recent messages, 'chats' spanning several hours — and even days — are possible.

Many of Micronet's pages can be viewed by basic Prestel subscribers in return for a pay-as-you-use fee. To get the best out of the Micronet service, however, it is necessary to pay a quarterly subscription of £12 in addition to the standard Prestel subscription.

## ELECTRONIC MAIL

Although Prestel has its own electronic mail system (Mailbox), it is actually a system that was added to the information service in 1984. Prestel is, in essence, an information service with a messaging system tacked on.

In parallel with Prestel's development, several other publicly accessible online systems have also developed. Most of these are called electronic mail systems. Curiously, they have developed information services on them. So many electronic mail services are — one might say — messaging systems with an information service added on.

Electronic mail (email) first arrived in the UK during the late 1970s. Based on the email services seen on bulletin boards, the commercial services offer fast and more secure transmission of mail at low cost.

Email networks have come a long way since the late 1970s. Today's service providers now offer a number of extra facilities — some free, others on a pay-as-you-go basis. The extra facilities often include an incoming and outgoing telex bureau service, an email-to-fax service, gateways into other networks and online databases.

There are three major players in the UK's email marketplace at the moment — Mercurylink 7500, One-to-One, and the brand leader, Telecom Gold. All three services are available at 300/300, 1200/75, 1200/1200 and 2400 bps, often with a series of error-correction modem ports available.

The cost of subscribing to the various email networks varies considerably, ranging from £5.00 per month plus usage on Telecom Gold, to £11.95 per month plus usage on Mercurylink 7500. Many subscribers receive modest bills of around £15 to £20 a month, but the size of your bill depends on how much you use the system.

## MULTI-USER GAMES

Just as text-based adventures on micros have proliferated in recent years, so online adventure systems have been highly successful as well. Online adventure systems have, in fact, been around since the earliest days of computing and modems.

Essex University was the first UK site where an online adventure system was available to the general public. Such was the success of the Multi-User Dungeon (MUD) adventure which ran on the University's computer, that the University authorities had to limit MUD's activities to the night-time hours.

MUD was, and still is, the multi-user game (MUG) that other online adventures are measured by. MUD was written by Roy Trubshaw in 1979, an undergraduate at the University. In 1980, another undergraduate called Richard Bartle expanded the game and revised its command structure into the MUD we know today.

The scenario of the game is similar to that found in Zork — a mystical land with goblins and dwarves to help or hinder your progress. There is an underground kingdom, a sea and an island. Players can become lost in forests or graveyards, drink poison and even fall off cliffs.

Another popular MUG is Shades, which is accessible on a gateway basis via the Prestel and Telecom Gold networks. Unlike MUD, which is available only in a standard ASCII scrolling format, Shades is available in both viewdata and scrolling formats.

## INTERNATIONAL LINKS

International communications is becoming increasingly popular, owing to the cost of accessing international networks — particularly those in the United States — being much less this way than dialling direct over the telephone. To access international networks, most users rely on a packet switching service.

Several telephone companies, including British Telecom and Mercury in the UK, have devised a special network to connect third-party computers together. These networks are known as packet switching systems. The UK data networks are known as PSS (British Telecom's Packet Switch Stream) and MPDS (Mercury's Packet Data Service).

Both these systems keep costs down to between 20p and 40p a minute by splitting the sent and received data into small packets of data, each conforming to an international standard known as X.25. This can be interwoven to make the maximum use of the line — just because you haven't typed anything for a few seconds doesn't mean that a whole line is going to waste.

While packet switching systems can be used for calls within the UK, they tend to be used for international data calls. Many major users — usually the host computers themselves — are permanently linked into the packet data networks. For the small and/or occasional user of such networks, dial-up access at a variety of modem speeds is available.

Because packet switching systems conform to an internationally laid down set of rules, the networks can by-pass the modem standards of a particular country. Thus, while a UK modem user may not be able to dial up and log on to an online service in the US, due to the differing modem standards between the two countries, she or he will find it very easy — as well as a lot cheaper — to call up the service via a packet switching network.

BT's PSS costs £40 to sign up, and £10 per exchange per quarter to use. Mercury's MPDS costs £15 to sign up and £10.50 per quarter to use. These charges exclude any usage charges which may be incurred. MPDS is about 40 per cent cheaper to use than PSS, although its quarterly subscription rates are slightly higher than those of PSS. Either way, costs can mount up quickly if you're transferring a lot of data.

## CONCLUSIONS

The world of modem communications has only been available to the home computer user for a very few years. From a business point of view, the plethora of online services available means that almost any business question can be answered online, at minimal cost and maximum speed.

For personal users, modems can add considerably to a computer's net worth. Telesoftware, news, and several interactive services all combine to make a modem one of the best value for money purchases ever in the computer world.

Online communications opens up whole new horizons for the computer user. The costs are insignificant compared to the enjoyment and benefits that can be derived, both at work and at play. Enjoy!

### FURTHER INFORMATION

**British Telecom Packet Switch Stream**
1-6 Finsbury Circus, London EC2M 7LY
Tel: 01-920 0661
Linkline 0800-282852.

**Dialcom Customer Sales (for Prestel and Telecom Gold)**
Tel: 0800-200700

**Mercurylink 7500**
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Tel: 01-847 6070

**Mercury Packet Data Services**
Mercury Communications, 1 Brentside Executive Centre, Great West Road, Brentford, Middlesex TW8 9DS.
Tel: 01-847 6070

**Micronet 800**
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Tel: (0442) 237788

**One-to-One**
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## FREE SOFTWARE

On Micronet you can browse through an extensive software library of free programs, select one and then download it.

We now have software for all popular machines, from the Spectrum to PC compatibles, including the Atari ST and the Amiga.

## INFORMATION

Micronet is also a computer magazine. Our computer news area is updated every day, so there's no better way to stay up-to-date, and our software reviews and features for all popular micros mean Micronet members are always better informed.

Add to this Prestel's massive database and you'll have all the facts at your fingertips.

## ENTERTAINMENT

Micronet is not just informative, it's also a lot of fun! As a member you'll have access to a range of games, including the UK's most popular multi-user game, Shades, where the action is live and so are your opponents!

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*If you have access to a modem (1200/75 baud) and viewdata communications software you can see a free demonstration of Micronet. Just Dial 0272 250000 and use the ID 4444444444 and password 4444.*

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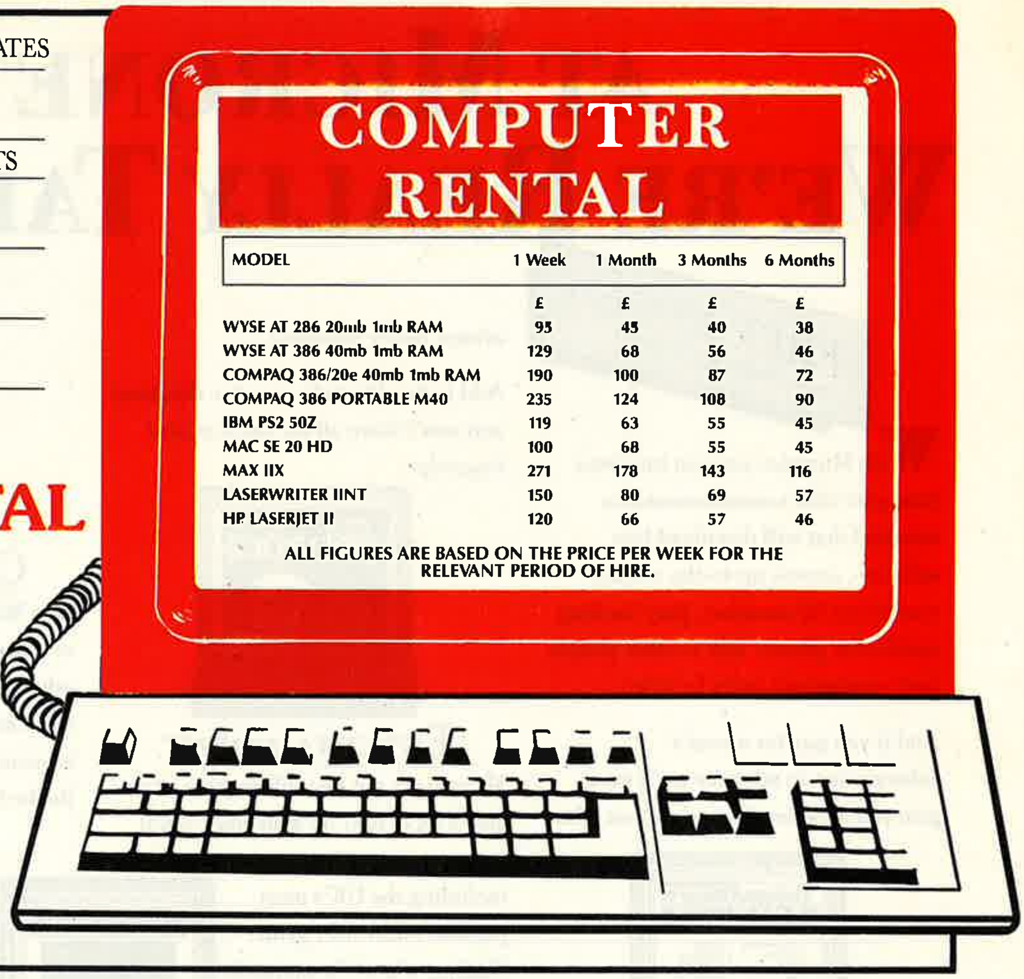

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| IBM PS2 50Z | 119 | 63 | 55 | 45 |
| MAC SE 20 HD | 100 | 68 | 55 | 45 |
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# Choosing a Modem

The modem world is a minefield of jargon. What does it all mean?

BY
**Peter Toothill**

Choosing a modem can be a traumatic experience. There are so many standards and types to choose from. There are all those V numbers, things like MNP, incompatible modems using the same speed and so on. On top of this, PC users have to choose whether they want an external or an internal type.

There are three basic forms of modem but only two are now in general use — card and standalone. Both connect directly to a telephone socket by means of a wire. Card types come in two forms — the one most users will come across is the PC card to plug into an IBM expansion slot (either PC or MCA); corporate and other major users of multiple modems sometimes buy models which can slot into racks, which saves money and space. The third type, the acoustic coupler (which is connected to a telephone handset by attaching cups to the mouth and earpiece), is virtually obsolete these days because of its low speed, inability to dial and sensitivity to room noise.

The advantages of a standalone modem are that it can be used with any type of computer that has a serial port, and it has a row of status lights on the front that help you to monitor the call. It also doesn't tie up a slot.

Modems are classified by the speed at which they operate. This speed is measured in bits per second, although a more common (if misused) term is 'baud'. Because of the way information is sent, each character transmitted uses ten bits. This means that at 300 bits/second (the slowest modem speed used these days) information is transmitted at 30 characters per second. This may sound quite fast, indeed it is a reasonable speed if you are reading but it is slow when it comes to moving data around. A 50k spreadsheet (not a particularly big one) would take around half an hour to transmit at this speed. Moving up to a 2400 bits/second modem would cut the time down to under four minutes. Bigger files (and they aren't hard to find) could make the time differences even more spectacular. Also faster modems are becoming available — 9600 bits/second models are now readily available at reasonable prices and modems supporting even higher speed are not far behind.

## BAUD EXPLAINED

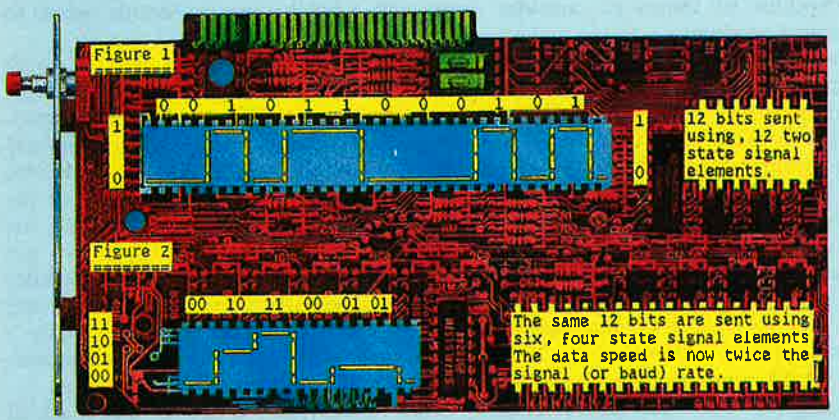
Figure 1
0 0 1 0 1 1 0 0 0 1 0 1
1
0
1
0
12 bits sent using, 12 two state signal elements.
Figure 2
00 10 11 00 01 01
11
10
01
00
The same 12 bits are sent using six, four state signal elements The data speed is now twice the signal (or baud) rate.

Modem speeds are measured in bits/second. That is the speed at which the data travels. Low speed modems use two frequencies to transmit data — one frequency to represent a zero bit and another for a one bit. The transition from one frequency to the next is called modulating. The rate of modulation is called the 'baud rate'. In Fig 1 it is the same as the data speed. Each element of the signal represents one bit of data. This is true for V.21 modems, so 300 bits/sec is 300 baud. At V.22, four frequencies are used. One each for the four possible combinations of two bits (fig 2). So each time the frequency modulates, two bits are sent. Each element of the signal represents two bits of data and so the modulation rate is half the data speed. At V.22, the data speed is 1200 bits/sec and the modulation rate is 600 baud.

## DUPLEX

Before looking at the standards themselves, we need to understand the term 'duplex'. A telephone conversation is 'full duplex'. You can interrupt, make affirmative sounds or even both talk at the same time if you want to. Contrast this with a radio telephone system where only one of you can talk at a time. When you finish speaking you have to release a button to listen for the reply.

The main advantage of full duplex working in a modem is that every character you type on your keyboard can be echoed back from the system at the other end of the line — what you see on the screen doesn't come directly from the keyboard but has been to the remote computer and back. This means that you can tell immediately if line noise has affected what you wanted to say. These days, virtually all modems and online systems work this way, but many terminal programs still have a 'half duplex' setting that is designed for systems that don't echo back what you type. In this mode, the echoing is done locally by the terminal program so you can still see what you type, but you don't know whether it got to the other end intact.

## V STANDARDS

Unlike many areas in computing, there is an international body (the CCITT) that sets down modem standards. This means that there is a fair chance that your modem can

communicate with others — even those in other parts of the world. The only fly in the ointment is the USA, but even there the newer standards are compatible with those set by the CCITT.

The CCITT (or Consultative Committee on International Telephony and Telegraphy) is part of the International Standards Organisation. The standards it defines in the area of modems are 'V' standards (such as V.21 for 300 bits/sec modems). The V standards are not all related to modems but the main ones that are are listed in the panel.

Apart from speed, any given CCITT standard also specifies a lot of other information that, because the standards exist, the average modem user doesn't need to know anything about. This includes such things as the frequency at which the modems communicate, the way the data is modulated on the line, what happens when the modem answers the phone and so on. All you really need to know to choose a modem is what speeds you want to use and which standards are relevant. You need both because, in some cases, different standards work at the same speed. For example, V.29 and V.32 are both 9600 bits/sec modems but they cannot talk to each other because they use different modulation systems. There is an added complication at speeds of 9600 bits/sec and above. This is the fact that some US manufacturers — whose products are available here — have produced their own versions of CCITT standards, usually in an attempt to make such modems at a more attractive price.

## THE STANDARDS

**V.21** is the slowest modem standard in general use today. It works at 300 bits/second full duplex. It is slow but is supported by all online systems and is good for use where phone lines are noisy and error correction is not available. Otherwise it is best avoided.

**V.23** is neither full nor half duplex. Strictly speaking it is called 'asymmetric duplex'. It allows transmission at 1200 bits/sec in one direction with a 75 bits/sec 'back channel' in the other. It was designed to squeeze as much speed as possible out of the phone line without using the expensive technology needed for the higher speed full duplex standards. These days its main use is with viewdata systems such as Prestel, the theory being that the user rarely has to enter more than one or two characters, which can be handled at the slow, safe speed, and the system will then send a whole screenful of data at the higher speed.

**V.22** is 1200 bits/sec, full duplex and the standard has been around for a while. However, V.22 modems have only recently become available at reasonable price levels. It is a good general purpose standard and is still the highest speed supported by some online systems

## BUYING A MODEM

Here is a checklist of things to consider before choosing a modem:

1) Do you want to use it with one specific online system? If so, which standards does the system support?

2) If you want to use a variety of systems, which is the common standard?

3) Do you want error correction? Almost certainly yes, if you are making anything other than low-ish speed local calls.

4) If you want error correction, will MNP class 4 or 5 suffice, or do you want V.42? MNP class 4 is part of V.42 and should suffice for the present. Anyway, few full specification V.42 modems are available. Again, this depends on what the systems you want to use support. Prestel currently uses Vasscom which is not as well supported as MNP.

5) If you are using a PC compatible, do you want an internal card or a standalone type? The answer depends on the number of free serial ports and slots on your PC, and on whether you will want to monitor call progress with the aid of the LEDs on the front panel.

6) What is your budget? If it is around £1500, you can get a high specification modem covering V.32 down to V.21 with MNP error correction as well. Below that, you will start having to decide what to leave out.

Prices of dial up modems start at under £100 and rise to well over £1000. The real bargains are generally non-Hayes compatible modems. For example Matmos recently advertised Racal V.21/22 modems for £55. In the Hayes compatible arena, one of the cheapest is the Pace Linnet (V.21/23) for around £100. A little more cash will get you the Microlink modem (which includes a Microlink subscription, a month's use and comms software) for £156. It is actually a Pace Linnet 1200 (V.21/22/23) which normally retails at around £200 on its own.

Also in this price range are the V.21/22 Dataflex modems. The pocket Stradcom is, as its name implies, a pocket, battery operated modem and costs around £175. The PC card version is a bit cheaper and can be had for under £150. Both come with Dataflex's Datalink software that includes MNP (level 2) and Prestel's Vasscom error correction. As far as I am aware, that is the only software implementation of Vasscom.

If you want V.22bis, then the two Amstrad modems are worth a look. The MC2400 is a PC card modem which can be had for around £180 and includes Mirror II software. The SM2400 standalone version

such as PSS (although that is likely to change shortly). It is less prone to the effects of line noise than higher speeds (where some form of error correction becomes virtually essential) and has the advantage of being the lowest speed compatible with the North American Bell standards.

**V.22bis** is an enhancement of V.22. It is 2400 bits/sec full duplex. With the advent of custom chip sets from manufacturers like Rockwell, it is becoming cheaper and consequently more popular. On a clean phone line it can be quite satisfactory; without error correction, however, it can be virtually unusable over long distances or when there is line noise. With error correction it represents a good compromise between speed and cost.

**V.32** has also been around for a few years but modems using it were hugely expensive. This is because it uses sophisticated technology to get 9600 bits/sec, full duplex out of ordinary phone lines. However, it is now possible to buy a V.32 modem for around £1000. Multistandard modems that cover everything from V.21 to V.32 (with the occasional exception of V.23) are available at around £1500. As yet, very few online services support anything faster than 2400 bits/sec. However, if you are seeking to move data between two offices in your organisation and you can specify the same modem for both ends of the link, V.32 is definitely worth thinking about.

## NON-STANDARD STANDARDS

Before custom V.32 chip sets became available when V.32 modems were expensive to build, modem manufacturers began looking at alternative ways of going above the 2400 bits/sec level.

The most expensive part of V.32 to implement is the part that allows it to be a full duplex protocol, so US Robotics, in its HST modem, adapted it to work in a half duplex manner. However, the company incorporated clever switching in the modem so that it could change from transmission in one direction to transmission in the other in a very short time. This gives the user the illusion of full duplex working.

Other modem manufacturers, such as Microcom (famous for devising the Microcom Networking Protocol — MNP) and Hayes took another CCITT standard, V.29, which was originally designed for use on four wire private circuits. They also devised half duplex versions with fast turn around.

Another US company called Telebit took a radically different approach. It started from scratch, as it were, and devised a totally new modulation method for its Trailblazer modem. Instead of using one basic transmission frequency and squeezing as much data as possble

costs a little more at around £200 and doesn't include software. If you would prefer a British made modem, Dataflex's Biscom V.21/22/22bis, PC Card modem is a bit more expensive than the Amstrad's at about £225 (including Datalink). For another £25 or so you can get the Quadcom which adds V.23.

All the above are Hayes compatible auto-dial, auto-answer modems. However, if you want to run an online service such as a bulletin board, then avoid the MC2400 as it won't automatically detect the speed of an incoming call.

In the middle price range is the Quattro Plus from Dacom. This is a PC card modem that supports a non-standard 9600 mode bits/sec as well as the usual four lower speeds. It includes MNP class 5 error correction and can be had for around £650. It is the successor to the card version of the very successful Quattro. If you want a high speed modem link between two sites, this one must be worth putting on your shopping list as it is the only modem in this price range to provide 9600 bits/sec. It won't, however, talk to 9600 baud modems from other manufacturers.

Apart from the Quattro Plus, in this price range you are still restricted to modems with a maximum speed of 2400 bits/second (V.22bis) but the main advantage is that extra money buys you built in MNP class 5 error correction (and maybe even full V.42). For example, Dacom's Unity Gold Plus (four speed, PC card type) including Datatalk software can be had for around £500. Tricom, the UK representatives for Microcom, the originators of MNP, has the 24/10 (V.22/22bis) for a RRP of £699 or a four speed version, the 48/24 for £799.

In the top price range, with RRPs of around £1000, 9600 bits/sec is the standard top speed. The main question is 'which standard?' The only true international standard, that allows modems from different manufacturers to talk to each other at 9600 bits/sec, is V.32, yet several manufacturers have produced their own non-standard high speed modems. Worth considering is the Miracom HST (at £995) because it is supported by a number of bulletin boards and CIX. Dowty's Trailblazer is faster (at a claimed throughput of 18,000 bits/sec without data compression) and can be had for £1300. Tricom and Hayes also have non-standard modems, but V.32 is the one to go for as this is the one likely to receive support by the major online systems.

Multispeed V.32 modems are being launched by all the major manufacturers. Worth considering is the Tricom Tornado 9/42. This adds MNP class 9 to V.32 (as well as the usual four lower speeds) and gives a claimed throughput of up to 38,000 bits/sec.

into it, as all the CCITT standards do, the system uses up to 512 separate frequencies and shares the data between them. This produces a modem with a top speed of over 18,000 bits/sec on ordinary lines.

## ERROR CORRECTION

We can't leave the subject of modem standards without talking about error correction. As we saw above, at higher modem speeds, transmission becomes very susceptible to the effects of noisy phone lines. This is not much of a prolem when you are using an electronic mail system at lower speeds because you can always correct the odd corrupted character introduced by the telephone system. Even if you don't, the meaning will probably be perfectly clear to the recipient of the message. However, it is a different matter when it comes to transmitting computer programs across telephone wires. A single altered byte can render a program unusable or, worse, give it the potential to damage files on the computer.

Error correction has been available since the early days of bulletin boards when Ward Christensen devised his Xmodem protocol. This is used for transferring files between computers — the data is split up into small blocks and each block is checked for errors by the receiving system.

Xmodem and its successors allow us to transmit files across noisy telephone lines, but they don't help with things like signing on to a system in the first place. At higher speeds, a noisy line can make it impossible for a caller to even type a name without errors arising in the process. What is needed is some means of allowing the whole of an online session, from signon to logoff, to be error corrected, not just when transferring files.

## CCITT MODEM STANDARDS

PSTN = public switched telephone network (the one we all use).

V.21 = 300 bits/sec full duplex modem for use on PSTN

V.22 = 1200bits/sec full duplex modem for use on PSTN

V.22bis = 2400 bits/sec full duplex modem for use on PSTN

V.23 = 1200 bits/sec asymmetric duplex modem for use on PSTN

V.24 = List of signal definitions for data interchange between terminal and modem (equivalent to RS-232c)

V.25 = Automatic answer sequence for modems on PSTN

V.25bis = Command language for modem control for automatic dialling, etc (not Hayes compatible)

V.29 = 9600 bits/sec full of half duplex modem for use on leased lines.

V.32 = 9600 bits/sec full duplex modem for use on PSTN

V.42 = Error correction protocols for use with modems.

V.42bis = Data compression standards for use with V.42 (not yet finalised)

A US company called Microcom stepped into the breach with MNP. This puts the error correction in the modem so that the blocks are built, checked and, if necessary corrected.

The levels of MNP currently range from 1 to 9. To some extent, the higher the number the more sophisticated the protocol. The most common classes found at the moment are 4 and 5. Class 2 is the minimum to aim for, class 4 is better and class 5 adds data compression and is becoming more popular.

In the last year there has been a lot of interest in taking MNP out of the modem and building it into terminal software so that users of non-MNP modems can still have access to error correction without needing to buy a new modem. Some very comprehensive implementations of class 4 and 5 have been incorporated in software such as Odyssey, Mirror III and MTE.

## CCITT V.42

In 1988, the CCITT produced a standard for error correction in modems. Prior to its publication, there was fierce lobbying both from those who wanted the standard to reflect the methods used in packet switching networks (called LAP, short for Link Access Protocol) and those who wanted MNP which, by this time had become a de-facto standard. The CCITT compromised by basing the standard on LAP-M ('LAP for Modems') and adding a requirement to support MNP class 4 as well. The CCITT said that any future enhancements (such as data compression) wold be based on the LAP protocols, not MNP.

Not many full V.42 modems are available as yet so I would recommend that you look for a modem with at least MNP class 4 error correction. Class 5 is also readily available and compatible with modems supporting other MNP classes and V.42.

## VASSCOM

The other error correction standard you may come across is Prestel's Vasscom. It was developed before MNP became popular in the UK and is not very well supported by modem manufacturers. I suspect that in the long run it will die out and be replaced by V.42.

It almost goes without saying that an unapproved modem (no green sticker in the UK) should not be used. It is illegal, and all mainstream modem manufacturers get their modems approved before launch.

Choosing a modem need not be a complex process. The two main issues are budget and intended use. If you expect to use it with a particular online system, check which standards it supports and buy the highest speed modem your budget will allow.

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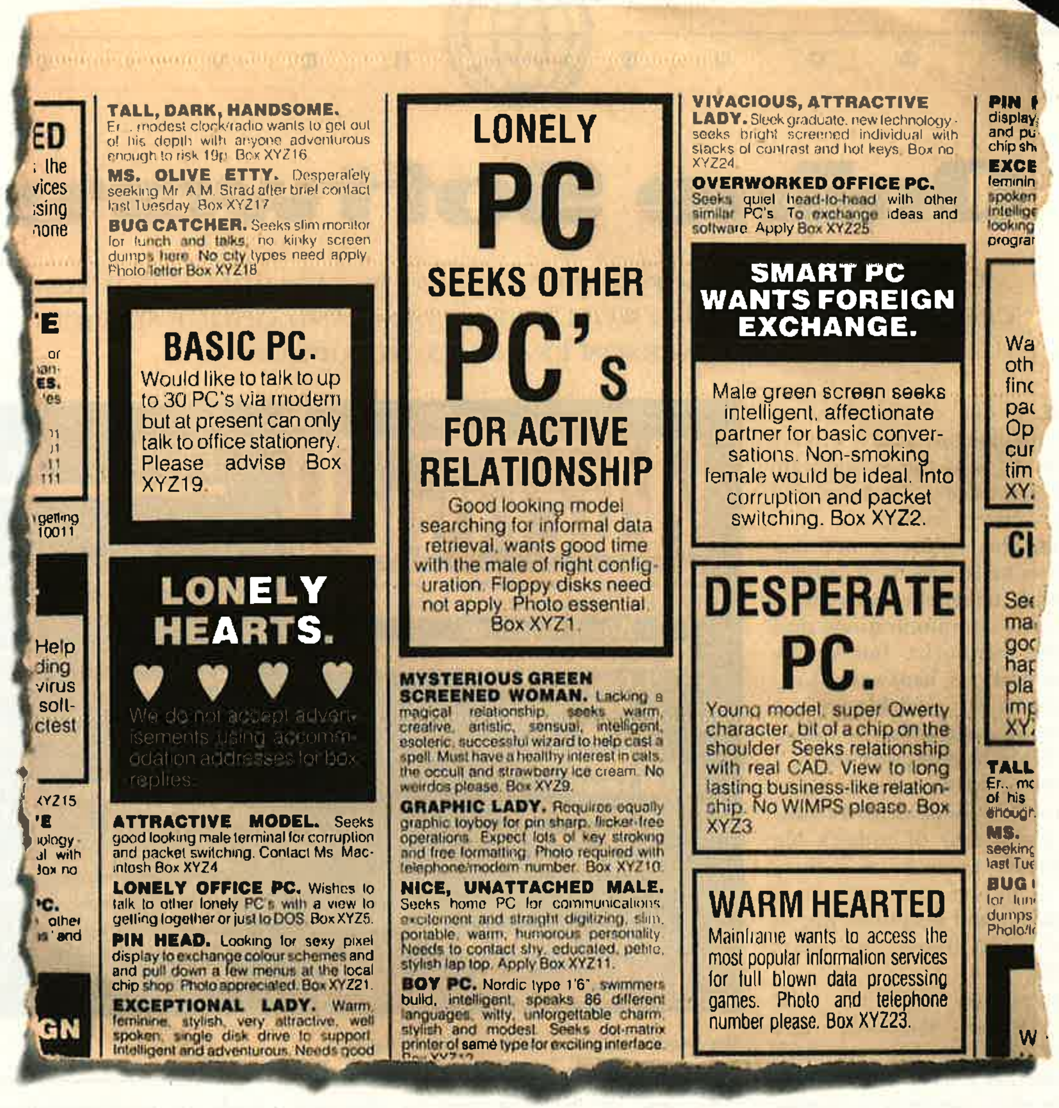

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**GRAPHIC LADY.** Requires equally graphic toyboy for pin sharp, flicker-free operations. Expect lots of key stroking and free formatting. Photo required with telephone/modem number. Box XYZ10.

**NICE, UNATTACHED MALE.** Seeks home PC for communications, excitement and straight digitizing, slim, portable, warm, humorous personality. Needs to contact shy, educated, petite, stylish lap top. Apply Box XYZ11.

**BOY PC.** Nordic type 1'6", swimmers build, intelligent, speaks 86 different languages, witty, unforgettable charm, stylish and modest. Seeks dot-matrix printer of same type for exciting interface.

**VIVACIOUS, ATTRACTIVE LADY.** Sleek graduate, new technology - seeks bright screened individual with stacks of contrast and hot keys. Box no XYZ24.

**OVERWORKED OFFICE PC.** Seeks quiet head-to-head with other similar PC's. To exchange ideas and software. Apply Box XYZ25

**SMART PC WANTS FOREIGN EXCHANGE.**

Male green screen seeks intelligent, affectionate partner for basic conversations. Non-smoking female would be ideal. Into corruption and packet switching. Box XYZ2.

**DESPERATE PC.**

Young model, super Qwerty character, bit of a chip on the shoulder. Seeks relationship with real CAD. View to long lasting business-like relationship. No WIMPS please. Box XYZ3.

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Mainframe wants to access the most popular information services for full blown data processing games. Photo and telephone number please. Box XYZ23.

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# Online Software

COMMUNICATIONS SOFTWARE NEEDS TO BE VERSATILE IF IT IS TO COPE WITH THE BAFFLING WORLD OF MODEMS AND ONLINE SERVICES. PETER JACKSON EXAMINES THE OPTIONS

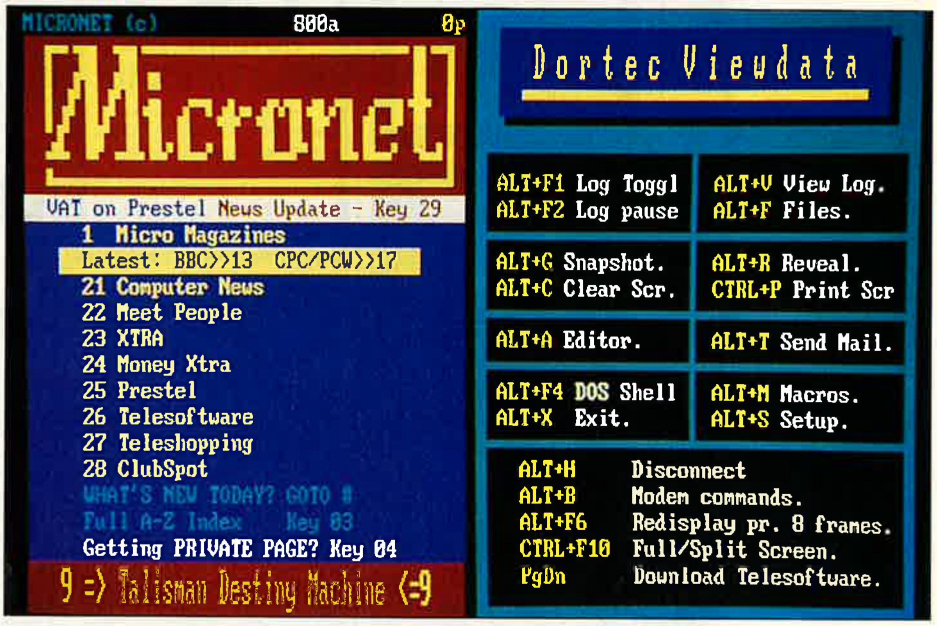
Communications is one of that band of special-purpose applications that is always threatening to break into the mainstream alongside word processors, databases and spreadsheets, and always failing.

The reason for this failure is not that communications is useless to most people, or that the British telephone network is less suitable for data communications than the US and other networks, but simply that the communications hardware, software and services so far available are too complex, hard to use, and prone to failure for the mass of business computer users.

The root of the problem is the modem. The hardware itself is fundamentally simple, involving just a few of today's big custom chips; but the connections it must make between computer and modem at one side and modem and telephone line at the other cause more trouble for users than anything else.

For communications software, the minefield of various standards and methods of working makes life very difficult indeed. In the early days it was common for modem manufacturers to supply their own communications software with their modems, since only they knew how to drive the hardware most effectively. Today, however, there is a semi-standard means of controlling modem features in software called the Hayes command language, or sometimes the AT language because every command sent from computer to modem is prefixed with 'AT' for 'attention'. If you buy a modem from Hayes itself, which invented the language, or a Hayes-compatible modem from any other manufacturer, then any communications package will be able to perform basic communications functions like dialling numbers, hanging up, and setting up the modem.

On the other hand, every new modem with features not implemented by Hayes itself — like MNP error-correction and data compression — extends the AT language as it sees fit to control the new features. Then, communications software may or may not support these new features directly. If the software supplier supports the particular modem, then all its features will be available. If it doesn't, then the user will have to use the AT commands to configure the modem properly, and this is a thankless and soul-destroying task that amateurs should avoid.



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MICRONET (c)              800a        0p     Dortec Viewdata
Micronet
VAT on Prestel News Update - Key 29          ALT+F1 Log Toggl    ALT+V View Log.
   1  Micro Magazines                        ALT+F2 Log pause    ALT+F Files.
   Latest: BBC>>13  CPC/PCW>>17
   21 Computer News                          ALT+G Snapshot.     ALT+R Reveal.
   22 Meet People                            ALT+C Clear Scr.    CTRL+P Print Scr
   23 XTRA
   24 Money Xtra                             ALT+A Editor.       ALT+T Send Mail.
   25 Prestel
   26 Telesoftware                           ALT+F4 DOS Shell    ALT+M Macros.
   27 Teleshopping                           ALT+X  Exit.        ALT+S Setup.
   28 ClubSpot
   WHAT'S NEW TODAY? GOTO 8                    ALT+H      Disconnect
   Full A-Z Index     Key 83                   ALT+B      Modem commands.
   Getting PRIVATE PAGE? Key 04                ALT+F6     Redisplay pr. 8 frames.
 9 => Talisman Destiny Machine <=9             CTRL+F10   Full/Split Screen.
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```

*Procomm's viewdata emulation is pretty flawless*

So one of the first jobs in choosing communications software is to check modem support. For straightforward Hayes-compatible modems at speeds of 2400 bits per second and below there is no real problem, since the command language is well-established, and as long as there is no MNP implementation and no additional special features built into the modem then selecting the inevitable 'Hayes Smartmodem 2400 or compatible' in the communications package's modem setup section will work. Higher up the modem ladder, particularly in the realms of 9600 bits per second MNP Class 5 devices like the US Robotics Courier HST or the Dowty Trailblazer, then the complexity of the modem means that it helps a lot for the communications software to know precisely what it is dealing with. With one of these fast modems, which are becoming increasingly popular, it is advisable either to select a communications package that supports the particular model directly, or to set aside a couple of weeks to figure out the settings from the modem documentation and then program it manually.

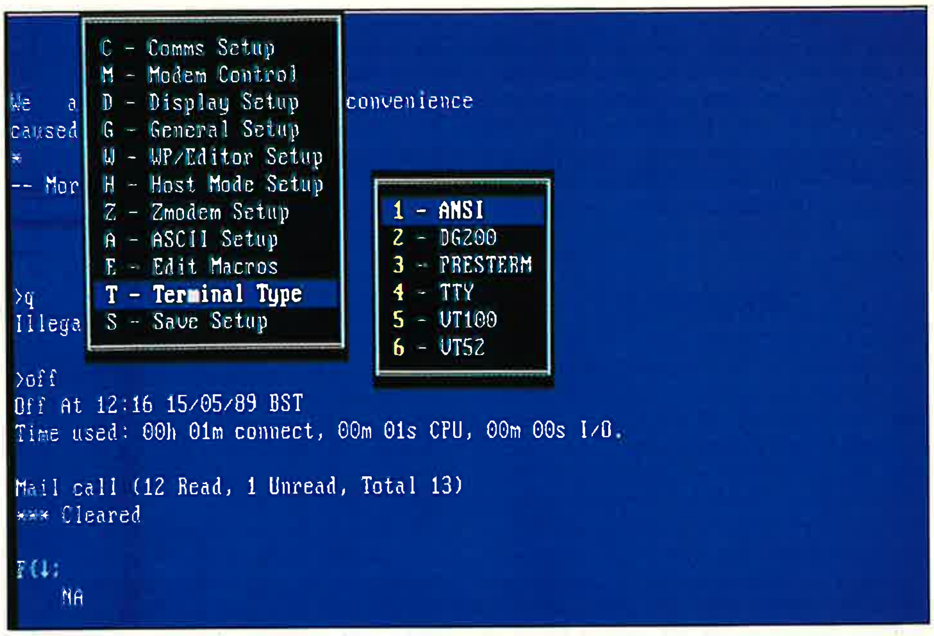
The absolute first job in choosing a communications package, though, is to decide what it is to be used for. Is there a need to hook into Prestel or other viewdata services? Are connections going to be made to minicomputers or mainframes, either locally or over a modem link? Are error-free file transfers of programs or other vital pieces of data an essential feature? And is the package to be used by unskilled operators who do not want to know about the complexities of modems or their ways of working?

These factors, which involve special functions that not every package supports, should determine the shortlist. Viewdata support, and the ability for the computer and its software to act like standard minicomputer and mainframe terminals such as VT52, VT100, IBM 3101, and others, are not standard fittings in communications software — in US-produced software at least. Such emulations as IBM 2780 and 3270, which normally require direct local connections and special hardware in the PC, can only be performed over modem links by a very few packages. The error-correcting file transfer protocols supplied, such as XModem, YModem, ZModem, Kermit, and any custom ones the software developer has thought up, determine how long and how accurate file transfers over telephone lines are. And setting up a communications package for unskilled operation depends on the features and ease of use of the 'scripting language' provided in the package to let users control on-line sessions.

At the bottom end of the communications software market, assuming that modem support at Hayes-compatible level, at least, is available, the extra features will be minimal. Any communications package must be able to dial up a remote computer automatically; manage the interactive task of sending what the operator types on the local computer to the remote computer, catching the responses from the remote computer, and displaying the entire transaction on screen; and be able to capture data from the remote computer, or entire transactions, to a local disk file for later reading or editing with a word processor, or for transfer into a database or spreadsheet. But beyond that basic set of functions, a low-end package may also include one terminal emulation — normally VT52 or VT100 — a couple of simple, slow, and not particularly accurate error-trapping file transfer protocols like XModem and Kermit alongside pure text file uploading and downloading, and a scripting language that does nothing more than let users automate short log-on sequences by sending the right codes and passwords to the remote system at the appropriate moments in a session.

At the very top end of the market, on the other hand, there will be a bewildering set of extra options like a dozen terminal emulations, including ones for obscure and obsolete Hewlett-Packard models, and twice that number of error-checking file transfer protocols, including the likes of YModem, YModem-g, Sealink, ZModem, and Uncle Tom Cobley and all. There will be a full text editor to compose messages, as powerful as some low-end word processors, and instantly available even while on-line to a remote computer. And on top of that, there will be a full programming language looking like C, Pascal, or Modula-2, allowing full customised applications to be set up with pop-up windows, pull-down menus, personalised warning messages, and complete program control over every possible function of the package.

There is one more function that has only appeared in a few packages at any level so far, but is worth mentioning here; and that is the handling of MNP error-correction and data compression in software running on the computer, rather than in software running on a microprocessor inside the modem. Some PC packages are now available offering MNP Class 5 in software on ordinary 2400 bit-per-second modems with no MNP support of their own, meaning that MNP-coded data comes from the remote computer into the local computer at 2400 bits per second, and is then expanded from the MNP compressed format into its original form to give an effective data transfer rate of up to 4800 bits per second depending on line quality and the MNP overhead.



```
        C - Comms Setup
        M - Modem Control
We   a  D - Display Setup    convenience
caused  G - General Setup
*       W - WP/Editor Setup
-- Mor  H - Host Mode Setup
        Z - Zmodem Setup          1 - ANSI
        A - ASCII Setup           2 - DG200
        E - Edit Macros           3 - PRESTERM
>q      T - Terminal Type         4 - TTY
Illega  S - Save Setup            5 - VT100
                                  6 - VT52
>off
Off At 12:16 15/05/89 BST
Time used: 00h 01m connect, 00m 01s CPU, 00m 00s I/O.

Mail call (12 Read, 1 Unread, Total 13)
*** Cleared

F(↓:
    NA
```

*Odyssey uses menus to set things such as terminal emulation*

Naturally, there are some drawbacks to this. First, the computer must be fast enough to manage the MNP de-compression at a sufficient rate to keep up with the compressed data coming in, since otherwise there would be little benefit in the technique. And second, on noisy lines errors caught by MNP would cause re-transmissions and this, linked with the overhead in the local computer doing the de-compression, can make the appearance of received data on the screen very jerky. Still, on today's fast AT clones and 32-bit 80386 systems processing speed is ample for software MNP as opposed to MNP running on the modem hardware.

Some software suppliers have tried to simplify the data communications business by shielding users from the details of communications hardware and software. These packages try to discourage users from attempting to use any modem not on the directly-supported list, stop them altering modem settings except under supervision, and otherwise limit what users can do. This is fine for those applications that are well-defined and never likely to change, but a better approach is to shield users to start with but then give them access to the re-configuration tools they need when needs, as they must, change over time. And with that access they must give clear and concise documentation about how to use it, since modem-makers' documentation is pretty much universally awful.

Somewhere in this spectrum of functions lies a communications program, or perhaps a few, that does near-enough exactly the job you need to do, or does rather more without being too daunting to set up and use. Then familiar choices like the look-and-feel of the program, whether it performs its functions at adequate rates, and whether the average user can learn how to drive it without a month of study, come into play.

## PROCOMM

In the PC market, there is an enormous choice of communications software just as there is an enormous choice in every other application area. At the low end in price, but not in features, is Procomm; this is a shareware package available from user groups and for downloading from bulletin boards — using another communications program, obviously — which offers a good choice of terminal emulations and file transfer protocols, has a rather crude editor, and has a scripting language perfectly adequate for automating log-on sequences. Its non-shareware big relation, Procomm Plus, extends the choices of emulations and protocols to a bewildering degree and adds to the power and flexibility of the scripting language while maintaining the 'exploding' windows, pop-up menus, and comprehensive and detailed modem control of Procomm for those who need it.

As with other US-derived packages, the basic Procomm program does not support Viewdata emulation and has no specific support for UK-designed modems. But for those with Hayes-compatible modem hardware, and no need for Viewdata, it is an excellent choice. And with other shareware products like the excellent Telix and QModem around, those who are willing to learn about the ins and outs of data communications will find that they offer all the power required without attempting to stop the user accessing that power.

The latest version of Procomm Plus, does have an extremely versatile and powerful Viewdata mode. Its particular strength is full-screen editing of viewdata pages and its support for things like telesoftware.

## ODYSSEY

Further up the range is Odyssey, a package written in Scotland by Micropack's Don Milne and having as its prime feature the provision of MNP Class 5 error-correction and compression in software. It also has the rest of the basic set of functions, with some nice extras including a built-in windowing text editor, the superior ZModem file transfer protocol — which not only has higher throughput than the others but can also resume a transfer where it left off after a break in connection — an excellent programming language that can drive every function in the package, and a pull-down menu user interface that gives simple access to everything that most users might want to do quickly and easily. However, Odyssey does not provide a list of supported modems, and requires users to work out what commands their modem needs to dial, hang-up, and otherwise control its hardware. Once these commands have been figured out Odyssey's script language can automate things, but it is unusual to find a package that will not even automatically use Hayes AT commands by default.

## MIRROR III

Further up again is Mirror III from Softklone Distribution, which started out as a complete clone of Microstuf's Crosstalk XVI package but has since developed into a full-featured medium-price package in its own right and found fame from being bundled with Amstrad's modem-equipped PPC machines. Meanwhile, Crosstalk has attempted to go further upmarket into corporate communications, with some customer resistance.

Mirror III scores because it has a much-improved user interface compared with its Crosstalk clone days, has an excellent scripting language that can do anything at all, and a very good on-line help system. It also has one very big advantage, which is that it can run in the background while other PC programs are active, and be popped up at any time with a simple hot-key combination. Using this feature takes up a lot of the PC's RAM, and large programs cannot be run while Mirror is resident, but it does mean that lengthy file transfers can be done in background mode without locking up the PC for the duration. And now that there is a UK effort to develop the package, partly through the Amstrad connection, full support for a wide range of UK-supplied modems and a Viewdata terminal emulation are built in. There are also add-ons that perform data compression using ACT's COMMpressor standard, or compression and error correction using MNP Class 5, although these are pricey.

## AND OTHERS

At the very top of the PC range, where large companies need communications packages with mainframe link support, a wide range of programming options to let them produce tailored applications, and an easy-to-use front-end for executives to handle easily, the main contender — apart from Crosstalk Mk 4 — is Relay Gold. This has a simple menu-driven interface and comes with a set of ready-defined parameters for connection with a range of mainframe and minicomputers, which the user can install simply by adding appropriate telephone numbers. But underlying this simple interface is a fully-programmable package that can be used to produce applications that look nothing like Relay Gold at all.

It can also perform 3270 terminal emulation over a modem, as long as the host mainframe has a piece of Relay software running on it, and this is particularly useful for laptop owners who need mainframe access on the move. Similarly, but in a less ambitious way, Simware's terminal emulation software for both PC and Macintosh will do the same job without the ease-of-use frills or the full set of functions of a mainstream communications program.

One other PC package worth a look is the UK-produced Datatalk, which again has Viewdata emulation and a simple front-end for end-users, although it does not have the programmability of some of the competition.

## MACINTOSH COMMS

On the Macintosh itself, there is a limited choice. Many users stick with public-domain or shareware products like Freeterm, Red Ryder, and ZTerm, while in the commercial market there is a limited choice available.

In the UK, and perhaps elsewhere, the obvious choice is Vicom III from AM Technology in Dorset. This has a rather annoying icon-based user interface, although this can mercifully be turned off, and otherwise has a full set of communications tools for both end-users and communications experts. The scripting language is simple but capable of most functions, the modem support includes awkward UK-specific models like the Dowty Quattro, the Viewdata emulation can use colour on a Macintosh II, IIcx or IIx, and there are handy extras like the Datascope for debugging and tracking down on-line problems by displaying the traffic through the modem.

However, the terminal emulations are limited to VT52, VT100, and VT102 as well as Prestel, the file transfer protocols are limited to XModem and CRC-XModem, and the program is copy-protected with a key-disk scheme. But despite these drawbacks, Vicom III is much better than Red Ryder in terms of performance, functions, and ease of use, if not in price.
left out of the communications revolution.

The other US-supplied package worth a look is Microphone II, which has a much more extensive programming language than Vicom III and otherwise provides everything that Vicom does and more, apart from Viewdata emulation and UK modem support. And it is worth pointing out that Vicom is constantly moving to support new modems that become popular, whatever their source; the new version 3.2, for instance, supports the USR Courier HST directly. On the other hand, Vicom is also one of those packages that tries to shield the user as much as possible from technicalities, and does not give enough information on modem settings in its manual to allow users to improve the automatic configurations.

But Vicom III and Microphone II, along with the shareware and public-domain packages, should get the Macintosh communications job done.

On other machines the commercial communications market is sketchy, or best served by shareware and public-domain packages. On the Atari ST, for example, most users seem to go for Flash or Uniterm, both shareware. And on the Acorn Archimedes many users may not want to go for communications at all, since an essential RS232 port to hook up to a modem is an optional extra rather than a standard fitting.

However, anybody with a computer and an RS232 port is ready to communicate, whether the communication is with another computer across the room, across the hall, or across a continent. And the communications hardware and software is available to do any of those jobs, although the makers and suppliers do their best to stop users actually doing anything useful by obscurantist approaches and illegible or incomprehensible documentation. Sometime soon, that will have to change. But for now, it is worth making the effort to keep in touch with the outside computing world.

Whatever piece of software you eventually decide on, make sure it is as versatile as possible, with the ability to handle a wide range of modems and system protocols.

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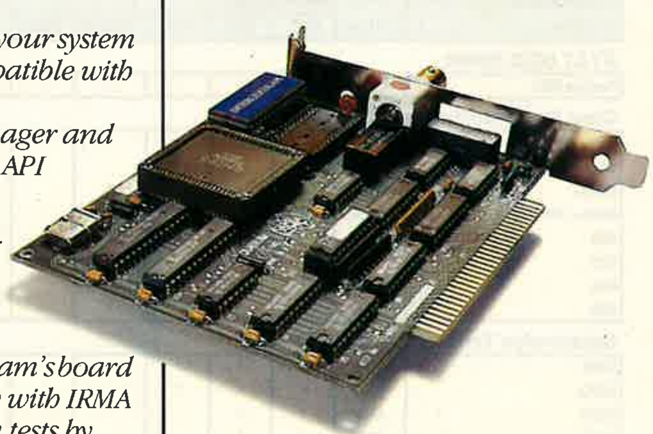

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| Manufacturer & model | Price | Speed rates | | | | | | Auto-dial | PC card | MNP Other | Hayes Compat. | Expan-dable | Num store /Blacklist | Dip sw | Speaker/ vol control |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | V21 | V22 | V23 | V22bis | 9600 | Other | | | | | | | | |
| **AT&T 0923 55550** | | | | | | | | | | | | | | | |
| Paradyne 9632 | P.O.A. | • | • | • | • | • | V32 | • | | 5/V42 | • | • | YES/YES | | |
| **Case Communications Ltd 0923 58000** | | | | | | | | | | | | | | | |
| 4612 Exec | P.O.A. | • | | • | | | | • | | | | | YES/YES | • | |
| 4612 | P.O.A. | • | | • | | | | • | | prop. | | | YES/YES | | |
| 400/24+ | P.O.A. | • | • | • | • | | | • | | 2/Spar | • | | YES/YES | | |
| 400/24+ PCX | P.O.A. | • | • | • | • | | | • | | 2/Spar | • | | YES/YES | | |
| 4524 | P.O.A. | | | | | | V26/V26bis | • | | | • | | YES/YES | | |
| 4532 | P.O.A. | | | | | • | V32 | • | | | • | | YES/YES | | |
| 4624 | P.O.A. | • | • | • | • | | | • | | | • | | YES/YES | | |
| 4896 | P.O.A. | • | • | • | • | • | V32 | • | | 5 | • | | YES/YES | | |
| **Datatronics Technology 021-704 1399** | | | | | | | | | | | | | | | |
| 1200A | £159 | • | • | • | | | | • | | | | | | | YES/YES |
| 1200C+ | £135 | • | • | • | | | | • | | | | | | | YES/YES |
| 1200H | £119 | • | • | | | | | • | • | | • | | | • | YES/YES |
| 1200P | £85 | • | • | | | | | • | | | • | | | • | YES/YES |
| 1200PN | £125 | • | • | | | | | • | | | • | | | • | YES/YES |
| 1200V | £149 | • | • | • | | | | • | • | | • | | | • | YES/YES |
| 2100 Coupler | £149 | • | • | | • | | | | | | | | | • | |
| 2400C | £189 | • | • | | • | | | • | | | | | | • | YES/YES |
| 2400H | £159 | • | • | | • | | | • | • | | • | | YES/NO | • | YES/YES |
| 2400P | £195 | • | • | | • | | | • | | | • | | YES/NO | | YES/YES |
| **Dowty Information Systems Ltd 0635 33009** | | | | | | | | | | | | | | | |
| Syncro 24PS | £545 | | | | | | V26/V26bis | • | • | | | | YES/YES | | YES/YES |
| Syncro 24PC | £495 | | | | | | V26/V26bis | • | • | | | | YES/YES | | YES/YES |
| Syncro 24 | £495 | | | | | | V26/V26bis | • | | | | | YES/YES | | YES/YES |
| Syncro 48PS | £645 | | | | | | V27ter | • | • | | | | YES/YES | | YES/YES |
| Syncro 48PC | £595 | | | | | | V27ter | • | • | | | | YES/YES | | YES/YES |
| Syncro 48 Dial | £595 | | | | | | V27ter | • | | | | | YES/YES | | YES/YES |
| Syncro 96 | £995 | | | | | | V27/V29 | • | | | | | YES/YES | | YES/YES |
| Syncro 1496 | £1,295 | | | | • | • | V29/V33/V32 | • | | | • | | YES/YES | | YES/YES |
| Mayze 24EP | £795 | • | • | • | • | | V42 | • | | 5 | • | | YES/YES | | YES/YES |
| Mayze 24 | £595 | • | • | • | • | | V42 | • | | 5 | • | | YES/YES | | YES/YES |
| Mayze 96EP | £1,395 | • | • | • | • | • | V32/V42 | • | | 5 | • | | YES/YES | | YES/YES |
| Mayze 96 | £1,295 | • | • | • | • | • | V32/V42 | • | | 5 | • | | YES/YES | | YES/YES |
| Minimo Plus 3 | £425 | • | • | • | | | | • | | 4/Spar | • | | YES/YES | | YES/YES |
| Trio 1222 | £545 | • | • | • | | | | • | | 4/Spar | • | | YES/YES | | YES/YES |
| Quattro/Quattrocard | £795 | • | • | • | • | | | • | • | 2/Arq/Spar | • | | YES/YES | | |
| Quattro 529 | £795 | • | • | • | • | • | V26bis/V29 | • | | 5 | • | | YES/YES | | YES/YES |
| Quattro Plus | £850 | • | • | • | • | | V26bis/V29 | • | | 5 | • | • | YES/YES | | YES/YES |
| Quattro Plus PC | £795 | • | • | • | • | | V29 | • | • | 5 | • | • | YES/YES | • | YES/YES |
| Trailblazer | £1,395 | • | • | • | • | • | 1800bps | • | | 3 | • | | YES/YES | | YES/YES |
| **General Datacom Ltd 0734 774868** | | | | | | | | | | | | | | | |
| Desktop V22 | £445 | • | • | | | | | • | | | • | • | YES/YES | • | YES/YES |
| Desktop V22bis wmd X251 | £695 | • | • | | • | | | • | | X25 | • | • | YES/YES | • | YES/YES |
| Desktop V22bis with MWP5 | £545 | • | • | | • | | | • | | 5 | • | • | YES/YES | • | YES/YES |
| Desktop V22BIS X | £595 | • | • | • | • | | | • | | 5/V42 | • | | YES/YES | • | YES/YES |
| Desktop V2G | £795 | | | | | | V32 | | | | | • | YES/NO | • | |
| Desktop V32 X | £1,295 | • | • | | • | | | | | 5 | | | YES/YES | | YES/YES |
| Desktop V33X | £1,295 | | | | • | | V32/V33 | • | | | | | YES/YES | | YES/YES |
| **Hayes Microcompter Products 01-868 1868** | | | | | | | | | | | | | | | |
| Smartmodem 1200 | £399 | • | • | • | | | | • | | | • | | YES/NO | • | YES/YES |
| Smartmodem 1200B | £349 | • | | • | | | | • | • | | • | | YES/NO | • | YES/YES |
| Smartmodem 2400 | £499 | | | | • | | | • | | | • | | YES/NO | | YES/YES |
| Smartmodem 2400 Quad | £599 | • | • | • | • | | | • | | | • | | YES/NO | | YES/YES |
| V-Series Smartmodem 2400 | £649 | • | • | • | • | | | • | | 2,4/V42 | • | | YES/NO | • | YES/YES |
| V-Series Smartmodem 9600 | £999 | • | • | • | • | • | | • | | 2,4/V42 | • | | YES/NO | • | YES/YES |
| **Infotron Systems 01-735 0731** | | | | | | | | | | | | | | | |
| SL 32 GT | £945 | | | | • | • | | • | | Trellis | • | | YES/NO | | |
| SL 33 GT | P.O.A. | | | | | | V33 | • | | | | | YES/NO | | |
| **Jaguar Communications Ltd 0727 41311** | | | | | | | | | | | | | | | |
| Duet X | P.O.A. | • | | • | | | | • | | Epad | • | | YES/NO | • | |
| Triplet X | P.O.A. | • | • | • | | | | • | • | 4/Spar | • | | | | |
| Jaguar 2424 | P.O.A. | | • | | • | | | • | | 4 | • | | YES/NO | | YES/YES |
| Quartette II | P.O.A. | • | • | • | • | | | • | | 5/V42 | • | | YES/NO | | YES/YES |
| Sextet | P.O.A. | • | • | • | • | | | • | • | 5/V42 | • | | YES/NO | | YES/YES |

| Manufacturer & model | Price | Speed rates | | | | | | Auto-dial | PC card | MNP Other | Hayes Compat. | Expan-dable | Num store /Blacklist | Dip sw | Speaker/ vol control |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | V21 | V22 | V23 | V22bis | 9600 | Other | | | | | | | | |
| Ramjet 2 | P.O.A. | • | • | • | • | • | | • | | 3 | • | | YES/NO | | YES/YES |
| Datajet | P.O.A. | | | | | • | | • | | 5/V42 | • | | YES/NO | | YES/YES |
| Bisynch 2426 | P.O.A. | | | | | | V26bis | • | | | • | | YES/NO | | |
| Bisynch 4827 | P.O.A. | | | | | | V27bis/V27ter | • | | | • | | YES/NO | | |
| Bisynch 9629 | P.O.A. | | | | | • | V27 | • | | | • | | YES/NO | | |
| Bisynch 14433 | P.O.A. | | | | | | V27/V29 | • | | | • | | YES/NO | | |
| Bisynch1496 | P.O.A. | | | | | | V27/V29/V33 | • | | | • | | YES/NO | | |
| **Octocom Systems (0635) 528 730** | | | | | | | | | | | | | | | |
| OSI8224A | POA | • | • | • | • | | | • | | 4/Int ARQ | • | | YES/NO | | YES/NO |
| OSI8224APC | POA | • | • | • | • | | | • | | 4/Int ARQ | • | | YES/NO | | YES/NO |
| OSI8224 APS | POA | • | • | • | • | | | • | | 4/Int ARQ | • | | YES/NO | | YES/NO |
| OSI8242A | POA | • | • | • | • | | | • | | | • | | YES/NO | | YES/NO |
| OSI8596 | POA | | • | | • | • | V29/V26bis/V32 | • | | | • | | YES/NO | | YES/NO |
| OSI8396 | POA | • | • | • | • | • | V26bis/V9 | • | | | • | | YES/NO | | YES/NO |
| **Pace Micro Technology 0274 488211** | | | | | | | | | | | | | | | |
| Linnet V21, V23 | £152 | • | | • | | | | • | | | | | YES/NO | | |
| Linnet PC Card | £99 | • | | • | | | | • | | | | | YES/NO | | YES/YES |
| Linnet 1200 | £239 | • | • | | | | | • | | | • | • | YES/NO | | YES/NO |
| Linnet 1200 Exec | £302 | • | • | • | | | | • | | 4 | • | • | YES/NO | | YES/NO |
| Linnet 1200 PC Card | £229 | • | • | • | | | | • | • | | • | • | YES/NO | | YES/NO |
| Linnet 1200 PC Card Exec | £329 | • | • | • | | | | • | | 4 | • | • | YES/NO | | YES/NO |
| Linnet 2400 | £385 | • | • | • | • | | | • | | | • | | YES/NO | | YES/NO |
| Linnet 2400 Exec | £469 | • | • | • | • | | | • | | 4 | • | | YES/NO | | YES/NO |
| Linnet 2400 PC Card | £299 | • | • | • | • | | | • | • | | • | | YES/NO | | YES/NO |
| Linnet 2400 PC Card Exec | £359 | • | • | • | • | | | • | • | 4 | • | | YES/NO | | YES/NO |
| Series 4 1200S | £399 | • | • | • | | | | • | | 4 | • | • | YES/NO | | YES/YES |
| Series 4 1200S Exec | £449 | • | • | • | | | • | • | | 4 | • | • | YES/NO | | YES/YES |
| Series 4 2123S | £275 | • | | • | | | | • | | | • | • | YES/NO | | YES/YES |
| Series 2400S | £499 | • | • | • | • | | | • | | | • | | YES/NO | | YES/YES |
| Series 4 2400S Exec | £549 | • | • | • | • | | | • | | 4 | • | | YES/NO | | YES/YES |
| **Paxdata 09277 61966** | | | | | | | | | | | | | | | |
| Ultimate 1496 | £1,595 | • | • | • | • | • | V32/V33 | • | | 4,5/V42 | • | • | YES/NO | | |
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| Quin PC | £1,499 | • | • | • | • | • | V32 | • | • | 2,5 | • | • | YES/YES | | YES/YES |

# Network Know-how

Just how do you go about linking computers together?

BY
**Rupert Goodwins**

The amazing thing about a talking horse isn't that it talks well, but that it talks at all. Anyone who's ever tried to network two or more computers together, and found the process more of a handful than the manufacturer promised, will feel the same way about their newly-linked micros. Everyone, it seems, knows someone whose experience of installing a LAN, or Local Area Network, has been the commercial equivalent of the Labours of Hercules but without the job satisfaction.

Networks are fabulous things. The sellers of networks promise dazzling things, some of which, surprisingly, are true. Buyers of networks uncover more mysterious terms, acronyms and codewords than even Ian Fleming could hope to get away with. Finally, the users of networks often find themselves on a voyage of discovery through manuals written in a language distantly related to English, while their previously obedient computer displays error messages only distantly related to common sense.

A good, appropriate, properly installed network can do many things. Everyone in the office can use the laserprinter as if it were connected directly to their printer port. Office memos can be distributed in a flash, while the photocopier stands idle in the corner. Telephone sales staff can check up on availability and pricing seconds after the figures have been updated, and keep the same figures up to date themselves.

Yet a bad, inappropriate, badly installed network is worse than useless, with files missing, programs running slowly, if at all, and previously reliable software throwing up errors. It can be very difficult, too, to pinpoint the source of the difficulty; some programs don't work with networks and others behave oddly. Good support from a dealer or the manufacturer is indispensible.

The joys and tribulations of networking both stem from the same source. Network two computers together and both get access to potentially double the data storage and double the number of peripherals, through what are effectively two lots of software. The complexity of the path from disk to screen, from keyboard to printer, has just doubled too, and with it the capability for errors to creep in.

This is made worse by the design of MS-DOS, the most popular micro-computer operating system. For much of its life, MS-DOS had no facilities for networking whatsoever; only versions 3 and 4 have any networking functions built in. Even then, they need substantial amounts of new software and hardware to make two or more computers talk. Much of the software that was written before networking was an issue is equally in the dark about what to do when two users try and alter the same file at the same time, a common occurrence on a networked system.

The good news is that, by now, most of these problems have been resolved. With several years experience under their belts, network manufacturers are now well versed in providing software that copes with both the vagaries of other software and the demands of the user. Good network software is invisible — you shouldn't have to know that the disk or printer you're using isn't really attached to your computer, and all your software should be able to use the files and facilities provided by other computers exactly as if they were local.

When choosing a network, there are two major configurations to consider. The first, most common among low-cost networks, is that with non-dedicated servers. A server, in network parlance, is a computer that provides something for users of other computers, and is usually the most powerful machine on the network. A computer configured as a file server has files that others want to use; a printer server is physically connected to a printer available via the network to everyone, and so on. Non-dedicated servers can be used for other purposes besides; the person physically using the computer can run a word processor, spreadsheet or whatever without — in theory

— noticing that other people are simultaneously using the hard disk. Dedicated servers just sit in a corner and serve.

At first, the non-dedicated approach might seem most tempting, since it doesn't involve having the fastest computer with the biggest disk tied up, apparently doing nothing for most of the time. However, even non-dedicated server software takes up a fair amount of memory, and pandering to the whims of six users does need a lot of computer power, so in practice the user stuck with the server will find the computer sluggish and unable to run programs that gobble up more than about 450k of RAM. Other users might also voice some discontentment if the person using the file server decides to reset the computer mere seconds before they're due to save their day's work.

Dedicated servers, since they can't run any other software, can use all of the computer's power. Since they don't have to use a general purpose operating system, such as MS-DOS, the software designers can optimise the way the computer uses the disks, memory and processor chips solely for network usage. Some non-dedicated servers are also designed to work better if they can use more of the machine, so even if you decide on this configuration you may have the option of using a dedicated computer to increase your network's efficiency.

In any case, it's a good idea to have one computer on all the time, even if non-dedicated, and have any shared peripherals like fax cards, printers or modems on this machine. That way, anyone can be sure of being able to find the service they want, even if everybody else has turned off their computers and gone home for the weekend. Some networks also offer electronic mail — a way of passing notes and files between computers on a network addressed by people's names — and to make sure that the intended recipients get their messages even if their computers are turned off, there needs to be another computer, capable of forwarding mail, always on.

One situation where non-dedicated servers can be appropriate is in a small office where no two computers do the same thing. If there are three computers, one for DTP, one for a customer database and one for secretarial work, then nobody will need to use another's hard disk — it'll mostly be smallish documents and messages passed from one to another, and perhaps everyone using the printer attached to the DTP station. Here, arranging for each computer to have a directory where the others can send or pickup files (most networking software allows you to decide how much of your computer is accessible and to whom) will be more cost-effective than introducing a fourth computer.

There are levels of networking to suit everyone. The cheapest and most popular is also one of the fastest and most error-free — the ancient and honourable practice of moving files from computer to computer on floppy disk. No matter what the advertisers tell you, if this method works for you then there really is little need to buy a network. When people want to share a printer, work on the same files or send each other messages, though, something a little more sophisticated is called for.

The simplest option, from the point of view of hardware at least, is that offered by the serial networks. These use an existing serial port (or, if necessary, a new one on a standard expansion board) and a special cable per computer. They rely on special software to drive the serial circuits in a PC much faster than usual, and can transfer files at around 10k a second, or five times faster than an RS232 port's normal top speed.

This is fine for the occasional file transfer, or sharing a printer between three or so people. However, it's not feasible to use it for multiuser databases or any other intensive application, so the software tends to be limited to non-dedicated, low performance tasks. The network also takes up an RS232 port, so those with a modem and serial mouse (for example) might need some more hardware.

This isn't so true for Macintosh owners, as the serial ports on the back of those machines have been designed as a low-speed network. Since this hardware comes as standard with all Macs, networking is more common and less fraught with potential problems (in other words, Apple has already made some of your decisions for you), and even quite large systems can be linked up with cheap cable.

The next least expensive option is the low-cost true network. This is similar to the serial network, except that an expansion card is needed for each computer. Because they've got hardware specifically designed for networking, they can go between 10 and 50 times faster than the serial networks; however, the software tends again to be based around low-cost, non-dedicated ideas but, sometimes, with dedicated features to improve performance. Cabling is usually cheap, four-core cable (commonly called twin twisted) with standard connectors; the maximum length of the network (usually in the order of a couple of hundred metres) can sometimes be extended if more expensive data cables are used.

Moving up, both performance and price wise, one of the most common network types is Ethernet. This was developed by Xerox in the US, and subsequently adopted as an American (read world) standard. It's fast — a megabyte or so a second — and since Xerox made the licence available to anyone for a nominal sum, with the specifications very tightly defined, there are a lot of Ethernet-compatible boards available from a wide range of sources.

Ethernet boards, generally speaking, don't come with much software. Instead, they have a few small programs which provide a standard software interface to their hardware. It's very similar to the BIOS in a computer, which knows how to work the disks, screen and keyboard and provides a well-defined set of controls to them for applications programs. Called NETBIOS, the network software can call or listen for another computer, send out a message and wake up other programs when one arrives. A working network can be set up with Ethernet cards with NETBIOS from one manufacturer, and NETBIOS-compatible software from another.

Another bit of software which Ethernet cards often come with is that to link them to a Novell-standard network. Novell Netware is the big name in microcomputing networks at the moment; it provides many services for high performance, especially with multi-user databases and other intensive applications. Dedicated server design, and links to minicomputers, have made the Novell standard an almost knee-jerk choice for many mid-sized corporate purchases.

The other common standard is Token Ring. This is faster than Ethernet, works with similar software and performs better under conditions of heavy loading. It's an IBM baby, though, and has so far been concentrated in installations also boasting an IBM mini or mainframe computer. Recent moves by Apple and others, who are now producing their own Token Ring cards, may mean that it will gain a wider acceptance, or it may mean that Apple (and others) are trying to get access to IBM strongholds. Whatever, the increased performance is not significant in most PC network conditions, and currently it's not a common choice for small to medium size installations.

Installation is often overlooked, with dire consequences. Laying out the proposed wiring on a scale model of the building or office is a good idea; if a budget is tight then cheaper cabling can make a big difference, and making provision for future expansion is easier. It can also be cheaper if it's possible to put the network cables in when the phone system is installed or rewired.

Once installed, a network brings new possibilities not only for enhanced productivity but for advanced mischief-making. For this reason, most networks offer some form of security; this is alas, often neglected until a prankster or worse gets out of control. For example, most software can restrict access to your disk to people with a correct password, and give different people different levels of security on different areas of your disk. But, normally, people don't bother to set this up and the software assumes that everybody gets access to everything. What is actually relevant changes from organisation to organisation, but it's important to consider the issue when specifying a network.

Another sadly neglected area is that of the backup. Especially with a dedicated server, a network tends to be like an electronic, efficient, eggs-in-one-basket system. There are a number of options, from tape streamers to optical WORM (Write Once, Read Many) drives, and some networks have options for automatically backing-up at fixed times.

The last thing to remember when deciding on a network is that most, if not all, of the jargon is dispensable. Performance figures — often quoted in Mb/s, or millions of bits per second — are roughly equivalent to the top speed of a car; interesting but not much indication of performance in traffic. So try and see the network in operation, and how fast it really goes, before deciding. Also, try asking your dealer whether he can let you have the number of another satisfied client.

It's a good bet that, in a few years time, networks will be as common in computers as disk drives, and no more difficult to use. But while the technology matures, there are still areas where the buyer has to beware. The benefits, however, are worth it.

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# Net Choice

NETWORKING NEED NOT INVOLVE THOUSANDS OF POUNDS AND REWIRING THE OFFICE. TONY DENNIS TAKES A LOOK AT WHAT'S ON OFFER AT THE LOW-COST END OF THE MARKET.

Not so long ago, nothing more was expected of the typical local area network (LAN) other than for it to allow users access to a shared hard disk and perhaps a laser printer — and that was about it. The current fashion, however, is for far more sophistication. Now a serious LAN must enable a desktop micro to look at files in a customer database held on a mini, interrogate financial records on the corporate mainframe, and permit a document to be printed out on a laser located three buildings away. Yet there is still much to be said for having a very simple network.

For a medium to large sized company planning to install a network, a very large proportion of the cost will always come from 'putting in the necessary cabling. Therefore if a firm is planning to call in an electrician or outside contractor to do the job, it might as well install something quite substantial. This is why so many companies have chosen Ethernet (co-axial) cabling — which is suitable for micros, graphics workstations and DEC minis — or Token Ring (IBM style co-axial) cabling which suits PCs, PS/2s, 3270 terminals and AS/400 minis. Those with enough money even install optic fibre cabling on the grounds that it can carry all kinds of data protocols, both current and future.

That's overkill, however, if all you want to do is connect micros on opposite sides of the room. The best choice for a low cost network is a simple twisted pair of wires. This is exactly why Apple chose the twisted pair for its LocalTalk network cabling. Amazingly, some companies — Synoptics, for example — have even found ways of offering Ethernet over a twisted pair instead of co-axial. An ordinary telephone line is also a twisted pair so it is theoretically possible to make use of this for data as well as voice communications. Companies such as Case can offer such a system but it usually involves installing a special switchboard. Another possible approach is to utilise the mains cabling as happens with Powerlan (see below for more details).

Another drawback with the standard approach to networking, is that it normally requires a special adapter card to be fitted inside the PC. Naturally adapter cards involve extra cost as well as additional aggravation particularly if you find that the network card starts to clash with other devices already fitted, such as graphics boards and modems. The major exception here is a PC with a network interface already bult-in; Apricot's Qi series which has Ethernet or all of the Apple Macintosh range with its built-in AppleTalk interfaces are prime examples.

An obvious interface to use for a local area network is therefore one which most PCs already have in the first place — namely a serial port — the only drawback to this being one of speed. The typical asynchronous port is capable of a maximum throughput of around 19.2k bits per second; compare that to Token Ring which operates at 4 megabits per second as standard. Thus a serial/asynchronous network is theoretically 200 times slower than Token Ring. Rated speeds are somewhat deceptive, however. For example, although Ethernet is rated at 10 Megabits per second, it is not necessarily always faster. The protocol used by Ethernet relies on detecting if any other data is already being transmitted. If data is detected, the network tries again after a short interval. Therefore on large networks it may be some time before a message can actually get through, thus lowering effective overall data transfer times.

One of the greatest drawbacks with sophisticated networks is their need for a dedicated server. Thus in order to install a working system, the user has to buy an extra PC which does nothing else but run the networking software. Worse still, the server should probably be at least an 80286 if not 80386 based machine with a fair amount of memory. Dedicated servers thus add enormously to the cost. The best solution is to have one machine running the network operating system as a background task, with other connected machines then acting as separate printer or electronic mail servers (also as background tasks).

## LAN FEATURES

What features should the typical micro user therefore be looking for in a basic LAN? Shared access to files held on a central hard disk is essential. An ability to share files should, however, also involve some degree of file locking capability so that two network users don't attempt to change the same file at the same time. Otherwise if two users are able to change the same file, it can become corrupted or will at least be only partially correct. File locking stops two users opening the same file, while more sophisticated systems have record locking instead. This stops users changing a particular screen within a file rather than locking the whole file up. Most good network operating systems at least let users look at (read) files even if they are unable to change the information displayed onscreen.

For printing files via a remote machine, some form of print queue will almost certainly be a bonus. This enables one user with an important file to place it at the top of the queue while another user can decide to withdraw a print job and use a local printer instead. The alternative is to have all print jobs spooled to disk, then fed directly to the shared printer in the order they were received.

The only other basic LAN requirement is some form of electronic mail whereby connected users can chat to each other.

The ability to attach a document to an actual textual message is nice but not absolutely essential. After all, one user only really needs to tell others what the file in question is called and they can find it on the shared disk.

One thing which low cost networks almost definitely cannot provide is shared access to certain serial devices like modems. This is mainly because any software based around the MS-DOS operating system cannot easily cope with complicated calls to the PC's serial port. Such considerations do not seem to stop suppliers claiming that users are able to share any device attached to the network. When challenged to say if this assertion covers products such as a fax cards and modem boards, the usual response is that such devices can be shared as long as multi-user software to drive it exists. If such software does exist then you can bet it will almost certainly have been written to run in conjunction with Novell's Netware or IBM's NETBIOS, never an obscure low cost LAN operating system. The only real way to overcome this problem seems to involve dedicating a particular machine as a communications server. Once again this is not a viable solution for those after a low cost LAN.

To give readers a more detailed idea of what exactly can be expected from a low cost network, six typical networks were chosen. All bar one of them — Farallon's PhoneNET (which is aimed at Apple Macintoshes) — are intended for IBM PC compatibles. A word of warning, however. Only MS/PC-DOS versions 3.0 or above are usually supported. This is because the MS-DOS Share command (first added to version 3.0) is normally required in order for files to be shared. So there may be a hidden extra cost for those planning to network early PCs if new copies of MS-DOS are needed.

## POWERLAN

Powerlan is a rather intriguing lost cost LAN which is available in the UK from Tech-Nel Data Products. The interesting aspect of this product is that it genuinely makes use of 'live' mains cabling as the transmission medium. All the user need do is plug the Powernet interface box into a spare power outlet and it will then be possible to communicate with any other PC so attached in the building. Since it has been estimated that cabling costs can form nearly two thirds of the total network installation bill, this represents quite a considerable saving. The cost of the Powernet interface plus Powerlan software is £399.

In truth Powerlan should appeal to companies with the occasional PC dotted around the building. It can therefore be used to exchange data between two PCs as well as giving access to remote printers. Powerlan is not a suitable vehicle for building small workgroups because only two PCs can communicate at any one time. On the other hand, it does work entirely in the background, consumes a mere 400k worth of diskspace and requires no dedicated server. Powerlan even claims compatibility with IBM's NETBIOS for running networkable software applications.

Powerlan is basically a serial network which transmits data at 9600 baud using a variant of the HDLC protocol. The clever part is the patented filtering method which enables data to travel error free over mains cables. To install the network, the user plugs the Powernet box into a spare socket outlet. There is an adapter which slots into the standard IBM PC or AT serial port (COM1, COM2, etc). The connection between the adapter and the Powernet box is completed using telephone style plugs and wires. This means that the PC itself is protected from mains spikes or surges. Theoretically, the two PCs don't even have to be on the same mains ring to be able to communicate. The only obstacle would be if two machines were on different phases of a three phase power supply, but even this hurdle could be overcome by installing a suitable connector at the mains supply.

This ability to communicate willy-nilly over mains cables presents serious difficulties should the user want to start transmitting sensitive data files. It would be quite possible to tap into the system, even from a neighbouring building. However, Powerlan does have some simple password facilities which should be enough to deter the casual hacker.

Being RS232/serial based, no special adapter card is required. This is extremely handy for PC compatible laptops, many of which have no facility for standard expansion cards to be fitted. In theory, 32 machines can be on the same Powerlan network. What happens, however, is that all file transfers (including files being sent to remote printers) occur in the background. During that time no other communications can take places involving the sending and receiving PCs. The maximum traffic would therefore be 16 communicating pairs! On the plus side, however, while files are being transferred, the user still has normal access to the local hard disk. Sadly, there is no ability to manage print queues. It is strictly a first in, first out situation but shared printers can be connected to either a parallel or serial port. It is quite possible to set up a single PC with access to three different remote printers, too.

Powerlan's greatest drawback is that it is too slow to provide access to 'virtual drives'. A virtual drive is where the user treats a remote hard disk just as if it were local. There is also no electronic mail facility. For users who only want the real basics of a local area network, Powerlan will suffice.

## AMSTRAD NETWORK

Alan Sugar's Amstrad is aiming to bring to networks the same approach that worked so well with the company's PC compatibles. Thus Amstrad Network is a low cost offering yet it still provides a reasonable degree of functionality. In fact, Amstrad Network is based on a long established product, Corvus' Omninet. The cost is, however, a mere £399 for a three station starter pack.

This price includes the necessary adapter cards for one server and two workstations. The good news is that although one PC must act as the server, it does not have to be dedicated to the task. The bad news is that only the server's hard disk can be shared which means that users have no access to files or applications located on other workstations' drives. As standard, Amstrad's product provides support for a maximum of six users.

Hardly surprisingly for a low cost network, Omninet uses twisted pair cabling but is rated at only one megabit per second. In reality, users will find that it is the speed of the file server's hard disk which is more important that the actual speed of the network link.

It is quite possible for multi-user software to be run on the Amstrad network since it has a special file-lock facility. A further benefit is that Amstrad offers a number of network compatible packages including networkable versions of Supercalc and Wordstar. There is also a basic electronic mail facility provided as standard. However, there is no ability to 'attach' ordinary PC files to messages.

One attraction of Amstrad's offering is that it can at last be upgraded to full blown Omninet — which Corvus calls PC NOS. This would enable 64 users to be connected on the same network and includes support for more advanced features such as multiple servers and links to other network types. Corvus also sells additional user packs to add workstations to Amstrad Network for £99 each. At £155 for each networked PC (or node as they are usually called), Amstrad Network must surely be the cheapest adapter based network around.

## MAINLAN

Amstrad's chief rival is generally regarded as being Sagesoft with its latest network product, Mainlan. This employs a custom network chip which has been labelled the Lanci (Local Area Network Communications Interface). Lanci gives Mainlan a rated speed of 4 megabits per second using a protocol which is similar to, but not compatible with, Ethernet. Each adapter card has two ports which should enable firms to daisy chain up to 63 PCs together. Despite this, Mainlan is only really intended for systems consisting of between two to ten computers.

Once again the physical medium is twisted pair cabling with adapter cards that plug into standard PC slots. The starter pack costs £599 for two workstations with additional workstation costing £199 each. As usual Sagesoft claims that Mainlan is NETBIOS compatible although in reality it would certainly run better with the networkable versions of Sage's own software offerings such as Financial Controller. In terms of printing, there is a controllable queue as well as the ability to return temporarily to the local printer should the user so desire.

In its favour Mainlan can support multiple file servers as standard, and none of them need be dedicated to the task. Another feature which will attract budget users is the fact that Mainlan's memory requirements can be configured to get as low as 14k, although installing the works will take up more like 200k. Since memory still isn't cheap this may well be an advantage.

Interestingly there are two ways of running the electronic mail function. One is to have a workstation configured as a mail server, the other is to do without. In the latter case, the sender is merely informed that the intended recipient is not currently connected to the system so the message could not be delivered. Mainlan does, however, have the ability to allow ordinary files to be sent along with messages. Overall it would be fair to say that Mainlan appears to offer all the functions of a basic network without becoming overcomplicated in the process.

## AUTOCOM

Autocom from Applied Knowledge seems worthy of a mention since it has one highly unusual feature: it is intended for networking PCs over the one form of cabling every firm must have — namely, the telephone line! All it requires is for the user to possess some form of modem since Autocom functions through any modem which supports the popular Hayes AT command set. At £149 for the software, Autocom is also quite cheap.

Unfortunately Autocom's uniqueness is also its Achilles heel. Its data speed is only as fast as the modems employed. In practice this would normally be 2400 bits per second. However, the modem market is changing fast and 9600 bps modems are now being sold for £999. Additionally, data compression techniques such as MNP5 and V42bis are being incorporated into 2400 bps modems which can push effective throughput speeds up to 4800 bps. Sadly modems which provide 9600 bps in one direction at a time (like the Miracom Courier HST) don't work well with Autocom's own protocol.

How Autocom works is that the user assigns the appropriate telephone for a remote PC against an entry for a particular drive or printer. Hence what appears to the user as drive E might in fact be the hard disk of a machine located miles away. It is also possible to reassign the standard printer port (LPT1) so that output in fact goes to a remote printer. One of Autocom's attractive features is that print buffering happens in the background leaving the user free to access another application. If a remote PC is accessing the local disk, the current application being run remains unaffected.

In general Autocom looks pretty slow, although once two machines have been connected a simple task like asking for a file directory of the remote disk looks reasonably rapid. As usual, Applied Knowledge claims Autocom is NETBIOS compatible for running multi-user applications. The electronic mail facility supplied with Autocom is very basic — in fact, no more than 70 characters are allowed.

There are a couple of possible scenarios where Autocom makes good sense. It is possible to connect two machines back to back with the correct serial cable, in which case speed becomes less of a problem. Companies with spare telephone extensions could also utilise Autocom internally without incurring terrific telephone bills. It is worth mentioning, perhaps, that there is a more conventional version of Autocom, Knowledge Net II, which costs £245. Naturally this utilises standard RS232 ports and twisted pair cabling.

This is an interesting system for anyone who can't face the prospect of recabling the office.

## PHONENET

The Macintosh market is a difficult market for third party network suppliers. It is nearly impossible to undercut Apple since so much of AppleTalk (Apple's own network) is already built into the Macintosh hardware and system software. One of the few companies to have attempted it is Farallon, whose products are available in the UK from Gomark and Computers Unlimited.

PhoneNet achieves its savings by (as the name implies) being designed to use existing telephone cabling and telephone style connectors. It costs £49 per connector kit as opposed to standard LocalTalk's £150. The only problem is that PhoneNet does not allow data and voice communications over the same piece of wire! One bonus with PhoneNet is that using Farallon's StarController it is also possible to overcome standard distance limitations associated with LocalTalk cabling.

PhoneNet is designed to be compatible with AppleTalk networking software. Those Mac users who want something different will have to consider TOPS (available from Sun); 3COM's 3+ or Novell Netware 2.15. None of these fall under the category of low cost alternatives, however.

## 10NET

An option users might like to consider is a network which can be run over a variety of different network cabling types. This is something which Novell's NetWare is famous for offering. However, although NetWare is powerful, it is also complicated and expensive making NetWare a poor choice for the user seeking a basic network. One alternative is 10Net which is supplied in the UK by Computer Marketing.

10Net's chief attraction is its flexibility. It is available at £349 for use over twisted pair for both PCs and PS/2 machines. The same software can also be run over IBM's Token Ring cards (in which case the software costs £125) or 10Net's own Ethernet cards (£499). For those who are security minded there's even an optic fibre option which starts at £475). Naturally 10Net claims compatibility with NETBIOS for running multi-user packages and in the case of electronic mail, it can be provided with sophisticated Network Courier software for £299.

10Net is less complicated to install than NetWare, for example, but like Netware can be bridged to other network systems. Unfortunately 10Net has made only a small dent in the UK market and lacks the strong links with the Macintosh which other rivals like 3COM can boast. However, it is probably one of the cheapest entries into optic fibre networking for those who require it.

## CONCLUSION

As can be seen no single network can claim to be the cheapest. It always depends on what the user is truly searching for in a basic local area network. If crude file transfer and remote printing facilities are all that is required both Autocom and Powerlan save the user from even having to install cabling! For Mac users, PhoneNet provides an alternative to Apple's own LocalTalk cabling. Those who want to start small but grow their networks can choose the Amstrad/Corvus combination or 10Net while those who have no desire to link to other systems might want to opt for Mainlan. The market is sufficiently diverse than there should be something to please every potential networker.

Whatever system you choose, try to see it in operation. Just because you're not spending a fortune on the kit does not mean you have no right to expect it to work properly. If possible, try to get a demonstration where you can give it a workload similar to the one it will eventually face when you come to use it. Things to check for are speed and how reliably it passes data.

The kind of low-cost network described here could easily benefit people who wouldn't normally consider networking, because it's either too complicated or too expensive but who like the idea of linked micros.

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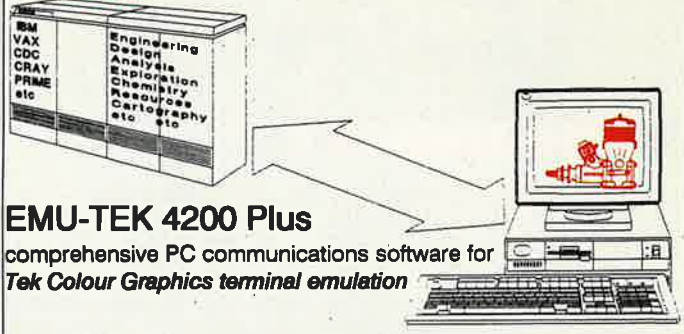

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The HST Courier, donated by Hawkastle, is capable of handling speeds from 300 to 9600 bits per second. And to make sure the data gets to its destination fast and in good shape the modem has MNP Level 5 error correction and data compression. The HST has become a favourite among bulletin board operators and online service providers, such as CIX.

Procomm Plus has earned its reputation as one of the easiest to use yet most powerful comms software packages. The latest version, supplied as a prize by Shareware Marketing, incorporates a sophisticate viewdata mode with features like advanced screen editing.

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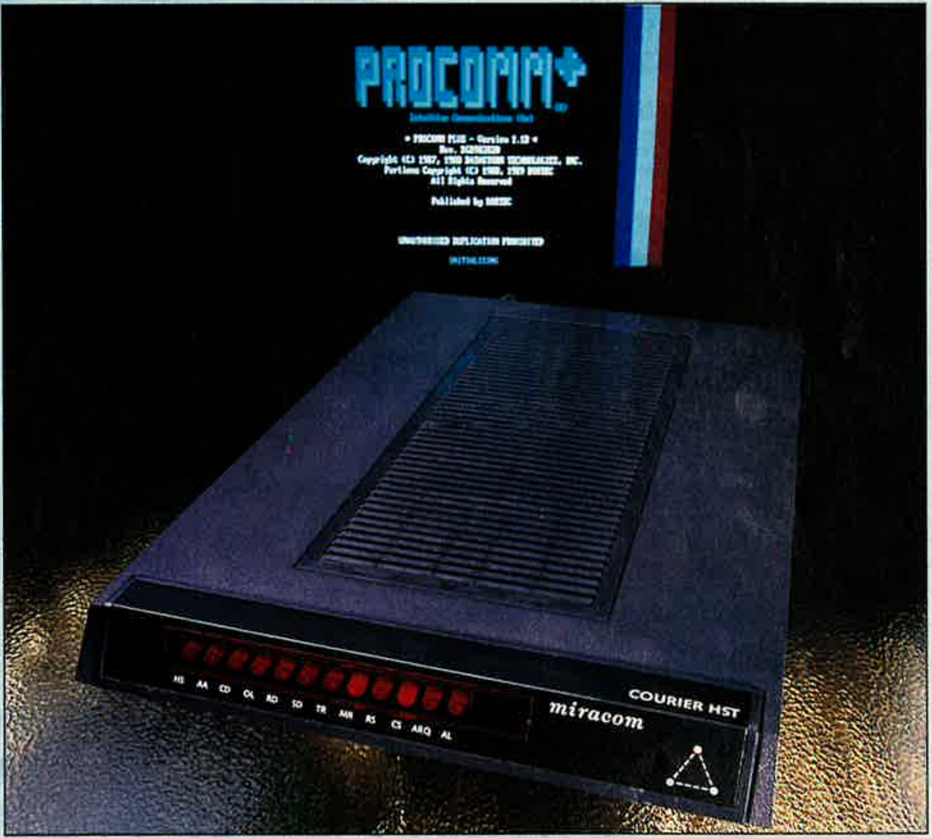

## QUESTIONS

1. What does MNP stand for?
2. Which is the most popular viewdata system in the UK?
3. Which company invented the 'AT' command set used to control many modems?
4. At what baud rate do V22bis modems operate?
5. In no more than 25 words describe a novel way in which the first prize could help a disabled person.

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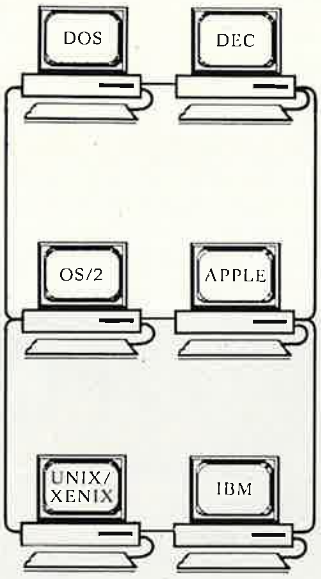

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# Consuming Interest

Feeding your micro or printer can be expensive, but there are ways to save.

BY

**Manek Dubash**

Environmentally sound paperless offices will save time as well as the planet's resources, so the argument goes. But as the market matures and more people become familiar with computers, such wide-eyed proselytising has quietened down somewhat. Instead, computers consume vast quantities of paper, ribbons, toner and floppy disks without really trying. Computers are like that.

So what are the best strategies for ensuring you don't spend more than you have to? We'll start with printers, because these machines and their consumables probably cause the biggest number of hassles of all.

## PAPER

Dot matrix printers tend to use perforated, continuous stationery — feeders for individual sheets are optional on many models, though. For our purposes, there are three variables to bear in mind: weight, size of perforation (if the stationery is continuous) and size.

Paper quality is generally measured by its weight. If all you want to do is produce program listings, the cheapest 60gsm (grams per square metre) will do. For business letters, thicker 90gsm or 100gsm paper is the norm, although you can go above this. Impact printers — that's dot matrix and daisywheels — usually allow some adjustment of the gap between print head and the platen. For lightweight paper, you may have to move the print head nearer the paper. The optimum is usually to move it the furthest distance from the platen that is compatible with a clean, dense print image. This reduces wear on both platen and print head.

If the paper is continuous, you may also get a choice of perforation. The cheapest is cut with wide slots between each sheet and leaves a ragged edge when separated. Micro-perforated paper is pre-cut using very narrow slots squeezed close together which gives a cleaner edge and makes it easier to tear.

Daisywheel printers normally use single sheets, such as standard letter stock. After all, their only advantage is their high quality output, so there's no point in using cheap perforated paper.

Beware when buying paper that your software will recognise it. The European standard is A4 (8.27in by 11.69in) while many US programs will only use 8in by 11in paper. If you find lines of print wandering up or down the page, the software is probably installed for the wrong size.

## RIBBONS

All too often, printer ribbons are neglected until the image quality starts to decline. However, it is best to replace a dot matrix printer's ribbon before it gets too dry. Debate rages about whether cheaper but physically compatible ribbons from third parties are a good idea: printer manufacturers say that their branded ribbons are the only recommended replacements. Makers of compatible ribbons claim that theirs will do the job just as well while costing less. In some cases, however, cheaper ribbons have been found to shed fabric particles and clog up the print head. A dot matrix printer, with its closely-packed, fast-firing pins, is more susceptible than a daisywheel to this problem. If in doubt, it's probably worthwhile spending the extra for a branded ribbon — if only because if something does go wrong you've got a better idea of where to point the finger.

Despite the claims of some advertisements, re-inking a ribbon is not an operation that can be repeated ad infinitum: at some point the thousands of impacts from the print head simply wear it out. So it's wise to examine the ribbon closely before re-inking and, if it shows signs of wear, throw it out. It's false economy attempting to save a few pounds if you ruin the platen or have to run a print job again.

## LASER PRINTERS

Laser printers have different requirements. They use toner rather than ribbons, drums rather than print heads and no laser printer uses continuous stationery.

Photocopy paper suffices for most laser printer applications. It is often coated on one side to give the toner a grip and so provide a crisper image, so use it the right way up for best results. There should be an indicating arrow on the package.

Laser printers are sensitive to paper weight. You may find that heavy weights — above 130gsm or so — may cause frequent paper jams in printers with a tortuous paper path. If you must use heavy paper, select the printer's straight-through paper path, if it has one. Very lightweight paper is prone to curling and dog ears. If you must print envelopes, you will probably need another printer. And, if you want to print labels, you need to choose the correct type that will not separate from the backing when heated. A label stuck on a print drum can be a messy and expensive mistake to rectify. The machine's manual should provide information on the range of suitable paper weights and types.

At least one paper maker suggests that laser printers are more sensitive to paper coating

and weight than photocopiers. The company claims that photocopy paper is too abrasive and could shorten a laser printer's life. We at *PCW* — laser users all — have yet to come across such a problem, however, and it is more likely that the natural life of the printer's drum, a replaceable item, will come to an end before abrasion becomes an issue.

## TONERS AND DRUMS

Toner is fixed — photocopier-style — on the paper by heat. The drum picks up toner and transfers it onto the paper. When the toner runs out, it will need replenishing.

Toner comes packed in a sealed cartridge. Methods of transferring it between cartridge and printer vary. The best allow you to swap one sealed unit for another. Others leave toner exposed to the air, whereupon a sneeze or gust of air can spread toner liberally over the innards of the printer, making a terrible mess. Your printer choice should take account of this factor.

The choice is easier than it may appear. The guts — or engines — of most laser printers are made by just a handful of companies — Ricoh, Sharp, Toshiba, Canon and Kyocera. Other makers simply add their own electronics. So, for example, Ricoh toner cartridges fit Epson laser printers.

Laser printer drum units, which may or may not include another replaceable part, the corona wire, need replacing every 20,000 sheets or so. Although printer manufacturers may say otherwise, it's usually advisable to wait until image quality deteriorates as drum units aren't cheap. Even then, you may find that cleaning the drum with a gadget supplied with the printer will clear any streaks that have appeared. You can save the cost of a drum this way.

## IN PARTING . . .

Finally, a note about floppy disks. When buying disks for a 1.2Mbyte or 1.44Mbyte drive, ensure they are clearly marked as high density, not double density. The two terms are not synonymous. Expect to pay between twice to three times as much for the high density versions of both disk sizes, compared to the standard, double-density ones. And buy as many as possible in one go — single disks are expensive. You can often pick up a box of 25 floppy disks for under £10 at the end of a show, along with cheap paper and printer ribbons.

Research your buying carefully. The computer industry is still young and bargains can be had from small shops, from mail order advertisements in magazines and from computer shows. Laser printer consumables are less easy to find cheap at shows but there are plenty of mail order outlets. Look in the back pages of *PCW*.

Buying consumables is something we all have to do, but it needn't be a nightmare or cost a fortune as long as you know where to look and what you are looking for.

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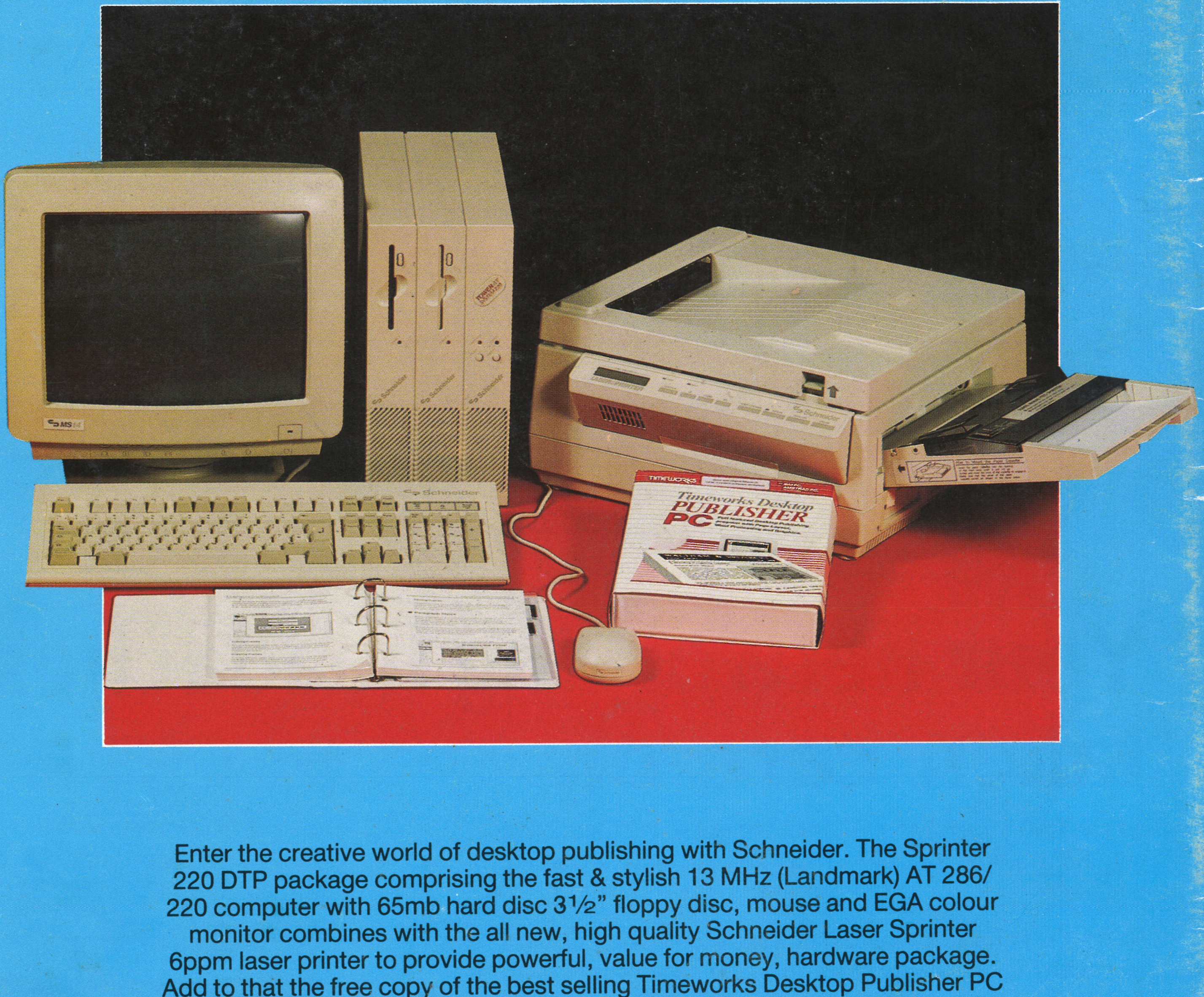

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